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The Science Shop for Biology
Report 52

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Maureen E. Butter (ed.)

Monitoring Network
Health and Environment

The Science Shop for Biology
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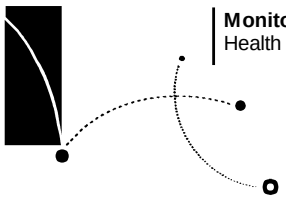

Policy Document

HEALTHY PLANET PLATFORM NETHERLANDS

Request to support Environment and Health Action Plans

Implementation and further development of National and Local Environment and Health Action Plans (NEHAPs and LEHAPs) will be a major topic in the forthcoming Third Ministerial Conference on Environment and Health, 16-18 June 1999. However, many donor countries did not follow the Helsinki Convention in which they agreed to develop NEHAPs and LEHAPs. This might give rise to the impression that environmental health problems are under sufficient control in these countries.

We, the Monitoring Network for Health and Environment, Women in Europe for a Common Future, National Association of Physicians for the Environment, Science Shop for Biology Groningen and Dutch Doctors for Sustainable Development, conjoint in the Healthy Planet Platform Netherlands, want to explicitly contradict such a notion. We take the position, that NEHAPs and LEHAPs are a pressing necessity to improve citizens' rights to a healthy environment for them and their children.

We kindly ask your support for our 'Ten-points Appeal to National Government'. Just mail, e-mail or fax your consent, your name, address, country and organisation to Maureen Butter, co-ordinator Healthy Planet Platform Netherlands, P.O.Box 14, 9750 AA Haren, Netherlands, Fax +31 595 57 1367, e-mail M.E.Butter@biol.rug.nl.

The appeal, with the list of signatories per country, will be available at the Healthy Planet Forum and will be offered to all delegates in the Ministerial Conference.

A TEN-POINTS APPEAL TO NATIONAL GOVERNMENTS

We, citizens, local groups, national and international organisations, would like to express our concern that many donor countries have not followed the Helsinki Convention in developing a National Environmental Action Plan (NEHAP) and local environmental action plans (LEHAPS). We have direct experience that many health and environment problems are neglected, that communication between citizens, public health and environmental institutions and NGOs is poor, and that participation in decision-making and access to information could and should be improved.

We are aware, that these problems are also present in many Eastern and Middle European states and that NEHAPs and LEHAPs at the moment do not address them properly in many countries. We urge governments who have not yet done so, to develop such plans in the near future. We strongly appeal to all governments to implement at the least the Åarhus Convention and the proposals of the London Declaration, including the Charter on Transport, Environment and Health and the Protocol on Water and Health and to develop a pro-active and forward-looking health and environment policy.

In particular we recommend to consider that:

1. Hundreds of local groups in Western Europe around waste incinerators and other polluted areas experience a blatant lack of interest in their often serious health problems
2. These groups systematically report lack of access to relevant information and a notable lack of communication between environmental and public health institutions as well as between environmental and health NGOs.
3. Another common phenomenon they report is that public authorities often decide in favour of employment and permit high pollution levels, even if they exceed legally stated safety standards
4. Participation of citizens and public health organisations is poor in environmental health decision-making both at the national and at the local level
5. In particular LEHAPs are well suited to promote such participation
6. NEHAPs and LEHAPs are particularly suited to develop an integrated approach to reduce environmental health risks of children
7. Reducing environmental health risks requires active involvement of parents, especially mothers in environmental decision-making
8. NEHAPs and LEHAPs, with full participation of citizens, could provide a framework to integrate and implement sustainable and healthy lifestyles
9. In order to reduce health risks of future generations it is vital to include reproductive health as a target in environmental policy, in particular NEHAPs and LEHAPs
10. NEHAPs and LEHAPs are potentially powerful tools to address emergent threats, such as diffuse pollution with endocrine disruptors

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Preface

In December 1998, I was asked to co-ordinate the Monitoring Networkk's Healthy Planet Project, preparing for London. At the moment I was occupied with the editing of our report 'Sustainable Development and Women's Health' and I expected not to have time before the end of January. As project co-ordinator I was expected to attend several preparatory meetings. I was in Soesterberg (Netherlands), Bled (Slovenia), Chisinau (Moldova) and Antwerp (Belgium), where I learned a lot and made many new friends. I thank the Monitoring Network for their trust in me and the Ministry of VROM for their financial support.

I was also supposed to organise several preparatory meetings with national NGOs. Although the time was too short for all interested parties to participate, there were enthusiastic people who found the time to attend the meetings and to give input, amounting to a policy document, the 'Ten Points Appeal, included in this report. The managers of the provincial Monitoring Stations have helped to gain broad support in the Netherlands. I want to thank everybody for their contributions. I especially thank Bernadette Vieverich, logistic assistant in this project.

And I was supposed to assemble a background document, which I certainly could not have done in so short a time without the generous contributions from the authors. I am happy to present here a document with contributions from both scientists and grassroots NGOs. For it is the individual citizens whose health is at stake and who need to make their voices heard in London.

At first I thought to make separate sections for research, citizens' experiences and NGOs. But that didn't feel right, I wanted it more "interactive". So the report starts with an introductory chapter, linking the various themes to the London Conference and substantiating the "Ten Points Appeal". Chapter 2 is an account of the problems local groups experience. Chapter 3 describes the political process around waste policy, one of the major issues: how it evolved and how it was influenced by coalitions of interest groups. Chapter 4 again shows the perspective of the citizens. Chapter 5 is an expert criticism of current epidemiological and toxicological practice. Chapter 6 presents results of an alternative approach to community health, using biological markers of stress and exposure. Chapter 7 sheds light on the mechanisms that tend to distort risk perception and communication. Chapter 8 analyses the practice of interactive decision making by involving the people who are exposed to occupational health risks. Both chapters address the question of dealing with uncertainties in decision-making. Chapter 9 is about science shops, the poor man's institute for second opinion, counter check and independent research. Chapter 10 presents "self-assessment" by citizens as a valuable tool for identifying hazards and empowerment of individuals and local groups. Chapter 11 presents the methods and organisation of the Monitoring Network and discusses possibilities to export the concept. In chapter 12 the broader perspective of sustainable development and health is addressed, by discussing the position of women. This raises the point of coherence in policy-making, and how to address causes rather than symptoms. Chapter 13 presents an interesting initiative to achieve more coherence. Chapter 14 gives an example of sustainable housing, where health and sustainability targets are combined in an updated approach to hygienics. Chapter 15 gives, from another grassroots NGO, some suggestions to promote healthy and sustainable lifestyles.

Maureen Butter, June 1999

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1. Risks, Health and Environment and the London Conference

Maureen E. Butter

Introduction

This report is made as a background document to the Conference on Health and Environment, London 1999, on behalf of and in co-operation with the Healthy Planet Platform Netherlands. Healthy Planet Platform Netherlands is a loose coalition of Dutch NGOs, who on initiative of the Monitoring Network for Health and Environment in conjoint effort prepared NGO input into the Conference and parallel Healthy Planet Forum. The Monitoring Network has received financial support from the Ministry of Housing, Spatial Planning and Environment for this initiative, but due to a late decision about the subsidy, there was very little preparatory time left. The Monitoring Network therefore employed the Science Shop for Biology to co-ordinate the London project and to prepare the background document, the reason being that I had some experience with international political conferences and that I am familiar with the Monitoring Network as well. From June 1998, the Monitoring Station Groningen has been situated at the Science Shop for Biology. This is an experiment, to see if such an intimate association of organisations with complementary interests could be mutually beneficial. The Healthy Planet Platform Netherlands took off, so to speak, with the NGO preparatory Conference in Soesterberg, 31 January to 1 February, 1999. The Monitoring Network organised a workshop 'Empowerment of Citizens' there. Various NGOs participated in one or more of these and subsequent preparatory meetings and discussions. The result is a conjoint policy statement, which has achieved broad support from groups and organisations in the Netherlands and has been sent into circulation amongst international NGO-networks as well.

This background document contains information from academic research, from NGOs and from local groups, whose interests are represented by the NGOs involved in the Healthy Planet Platform Netherlands. It provides background information to the points raised in the 'Ten-Points Appeal'.

NEHAPs

From 16-18 June 1999 Ministers from 52 states will meet at the third European Conference on Environment and Health, organised by the World Health Organisation (WHO). NGOs have been participating in the drafting committees of the preparatory meeting and will also participate in the Ministerial Conference. UNED-UK, the British NGO that has been charged by WHO to co-ordinate NGO-input into the Conference, organises a parallel NGO-conference in London, the Healthy Planet Forum. This is, for regional conferences, a novelty. But it is in line with the Åarhus Convention (1997) on public participation, access to information and access to justice in environmental decision-making. Most countries have yet to ratify the Convention, but the principles have already been applied to the preparations for the London Conference. The draft declaration for the London Conference contains a chapter on participation, access to information and access to justice, which part has been prepared by the Netherlands.

The London Conference is the third ministerial conference in the European region on Health and Environment. The first was in Frankfurt, in 1989. The Frankfurt conference resulted in the 'European Charter on Environment and Health' (WHO-ECEH) and set targets for an integral approach to environment and health. The second conference, in Helsinki 1994, identifies the following priority issues:

- microbiological contamination of food and water
- ambient and indoor air pollution
- road, home and occupational accidents
- deteriorating living conditions in the urban environment

- occupational health
- consequences of armed hostilities

One important result of the Helsinki Conference was the Environmental Health Action Plan for Europe (EHAPE) which sets guidelines for national health and environment policy-making. Each country was to develop a so-called NEHAP, a National Environment and Health Action Plan, in coherence with Agenda 21, national environmental plans, public health policy and other relevant sectors, such as agriculture, transport, energy and industrial production. In accordance with the NEHAP, local environment and health action plans are to be developed, to promote local implementation and coherence and integration of health, environment and other sectoral decision-making.

In the UNED-UK's news letter Simon Bullock remarks:

> " London '99 is the third European Conference on Environment and Health. The first, in Frankfurt in 1989, issued a set of `principles for public policy', to guide action on environment and health. These were excellent and far-sighted, including such statements as `The health of individuals should take clear precedence over considerations of economy and trade', `special attention should be paid to disadvantaged groups' and `There should be a responsibility to show that [new processes and technologies] are not harmful to health or the environment'.
>
> The second conference, in Helsinki in 1994, called on governments to produce National Environmental Health Action Plans (NEHAPs). And now, 10 years on, London '99 is to consider how to develop and implement these NEHAPs. It is to be hoped that these NEHAPs will finally start to deliver on the 1989 principles, and produce policies which actively reduce risks and damage to health and the environment."

Bullock proceeds, criticising the UK NEHAP, for being little more than a collation of existing environment and health practice, amounting more to "glossy paper exercise" than real progress. One strong point he acknowledges: 'The first NEHAP was ground-breaking in some ways: setting out the need for integrated policies, and involving collaboration between the departments of environment and health.' (Bullock, 1999). Well, we couldn't accuse the Netherlands from the same shortcomings, since the Netherlands has abandoned the idea of a NEHAP (Tweede Kamer, 1998, letter of the Health Minister). A NEHAP, the Minister wrote, would not yield more effect than existing policies in the field. The government has been criticised for this decision by Hans de Mann, secretary to 'Dutch Doctors for Sustainable Development'. He accuses the Minister of complacency, for by stating that the Dutch definition of health protection largely corresponds to WHO's definition of 'environmental health' she seems to imply that environmental health policy is quite advanced. Yet, the Ministry takes current trends such as traffic development and climate change for granted and seems to entirely ignore the aspect of public participation in decision-making and the preparations for the London Conference (De Man, 1999).

LEHAPs

Especially the interactive and participatory element in decision-making in local Environment and Health Action Plans (LEHAPs) could greatly benefit the citizens actually suffering from environmental health problems. One could argue, that the Local Agenda 21s form a perfect setting for addressing such problems, but that doesn't seem the case. Due to the voluntary character of the LA21, only about 25% of the communities put some effort in developing them, and, far from providing a framework for integration of social, economical and environmental decision-making, they appear to turn out as purely environmental discussion platforms (Schultink, 1997). Communication and co-operation between the public health and the environmental sector in environmental health matters exists in some specialised departments, but certainly can't be taken for granted. At present, the Monitoring Network for Health and Environment is involved in a communication project, to improve communication between health workers, citizens and environmental departments and NGOs. They co-organised, with social work organisations, science shops, citizen groups and health and environment experts, a symposium in November 1998. From the exchange of information, it appeared how little the different organisations know about each others' operating procedures and possibilities (LCO, 1998).

Networks of local groups from all over Europe report lack of communication and lack of access to data as major problems precluding improvement of local environmental quality (Pierre-Emanuel Neurohr,

Antwerp Meeting of local groups and NGOs[1], Van der Wal, 1999, and chapters 2, 4, 6, 10 of this report)

Communities are responsible for preventive health care, including environmental health. But due to lack of finance there are far too few environmental medical specialists to do the job, and their number is still declining. There is not enough capacity to develop environmental health plans, or even to advise the local authorities about environment and health aspects of policy plans (Anonymus, 1999).

Waste incineration, a case in point

Waste incineration seems to be a case in point, as many local groups experience health problems in the vicinity of waste incinerators (Van der Wal, 1999, and chapters 2, 3, 4, 10). Waste incineration is part of the larger issue of waste production and disposal. Included in this report is a thorough study by Jan Eberg (chapter 3), how this issue evolved in the Netherlands in the force field of social interest groups. Continuously, there has been some discrepancy between the state of affairs as defined by the government and the waste disposal in practice, 'window dressing' on the one hand and permissive tolerating attitudes to violation of the rules, which were far too slack to begin with. It took a long list of scandals and affairs, to many of with authorities were accessory to adjust the rules. Eberg concludes that the problem of health risks, seems to have been solved now, at least in a technical sense. And indeed, guidelines and standards for waste incineration in the Netherlands nowadays belong to the strictest in the world (Chandler et al, 1997). Local groups on the other hand simply don't believe in guidelines on paper, nor do they trust the risk evaluations. Municipal waste incinerators don't incinerate just municipal waste, emissions are not or not adequately measured, some streams are not taken into account and there are frequent technical breakdowns, exposing the inhabitants to extra discharges. If the emissions are really below the standards, the standards are wrong, because the community experiences health problems and there are unexplained deaths of domestic animals (chapter 2, P.E. Neuroth, pers. comm. Antwerp, 1999). Strangest of all, that waste incineration is not even efficient from a cost point of view. Two economists demonstrated that landfill and energy production from land filled waste yields better returns than energy production of waste incineration (Dijkgraaf and Vollebergh, 1998).

Reproductive health, women's health and health of children

Although NGOs have been participating in the drafting committees of the preparatory meeting, they were excluded from the first stages, where the agenda was set. They have been urging to include a gender perspective, but it was refused (Marie Kranendonk[2], pers. comm.). Yet, such a perspective could greatly contribute to linking environmental health to social and economical issues, thus achieving more coherence in sustainable development, in international, national, as well as local decision-making. Butter (1999a) explores some of the major crosscutting issues, linking gender to health and environment. One key concept, linking social, behavioural and environmental aspects, is reproductive health in a most inclusive sense. From the perspective of a population biologist, reproduction is the most important predictor of population dynamics. From an environmental health perspective, male germ cells, prenatal development and childhood are the most vulnerable stages in the life cycle. Therefore, children's health should be a core issue, and it should include parental reproductive health. From a sustainable development perspective, future generations are most important, reason why a youth's perspective is acknowledged in participatory policy-making. But there wouldn't be any viable youth, but for parents taking care of the most vulnerable stages of human life. Therefore, a parent's perspective, and in particular the mothers', should receive due attention in all decision-making with consequences for safety and health of children. Child development and health can be gravely affected by prenatal exposition to environmental pollution (Koppe et al., 1999, Duijm, 1999). Yet, in practice, environmental perinatal health is inadequately protected. PCB and dioxin levels in breastmilk in the Netherlands belong to the highest in the world. Exposition to hazardous substances at home, at the working place and by food and water, is not precluded (chapter 12, Koppe et al., 1999, Duijm, 1999).

Risk communication and the problem of not-knowing

To public health experts, risk communication is the art of getting their message through to the layperson,

[1] Pierre-Emanuel Neurohr was invited as keynote speaker at the Antwerp meeting, 24 April 1999, of some 15 local groups and NGOs. Neurohr is one of the founders of a network of local groups in France, with some 200 groups, situated in polluted areas.

[2] Marie Kranendonk is director of Women in Europe for a Common Future, and co-founder of ANPED, a network of European NGOs, also involved in the London process. ANPED an UNED-UK co-organised the Soesterberg Conference in 1999.

in such a way, that the latter is either reassured or enabled to take some preventive action (Woudenberg, 1996), in a chapter of the Dutch 'Manual for Environmental Health, in use by Public Health Services). An attitude, frequently criticised by the Monitoring Network and citizens groups, is the fear, or in some cases the expectation, that risk communication will cause panic and actually *make* people sick (Van der Wal, 1999, and chapters 2, 10). Communication, Woudenberg states, is a two-way process, and uncertainties should be communicated as well. Yet these two points are hardly elaborated in his paper (Woudenberg, 1996). Butter and Van der Wal in their paper plead for acknowledging the expertise and know-how of the citizens in their own right and involving them in addressing the situation (chapter 10). Risk communication often serves vested interests and the content of the message essentially boils down to 'no need for concern' (chapters 2, 3, 5, 6, 10)). My personal experience with requests for second opinions is that it is often more important to explore the dimensions of what is *not* known than the reverse. Dealing with uncertainties has resulted in a call for more participation and interactivity in policy-making. Yet, Karen Adriaens' contribution to this report about social learning and MAC-values criticises the lack of interactivity in the *risk assessment* stage (chapter 8).

The practice of risk assessment in complex systems is in itself a hazardous affair. It often involves model approaches and calculations with no real data ever measured (Howard and Staat de Yanés, 1999). According to Ashford and Miller, in their contribution to this report (chapter 5), a *paradigm shift* is on its way, from extrapolation of acute clinical effects of single substances towards subclinical effects from multiple causes, eliciting multiple responses. As a paradigm shift in general invokes a lot of dispute between experts, it will result in increased uncertainty and more 'not-knowing'. There is hazard in 'not-knowing', as Kerstin Dressel demonstrates in her contribution to this report (chapter 7). Not only vested interests may block effective decision-making but also an emotionally based tendency to ignore disconcerting messages, a *reluctance to accept risks*. The reluctance to acknowledge health risks is important factor to take into account when evaluating citizens' communications about environmental health hazards.

The burden of proof

> 'Before Love Canal, I also needed a 95 percent certainty before I was convinced of a result. But seeing this rigorously applied in a situation where the consequences of an error meant that pregnancies were resulting in miscarriages, stillbirths, and childreb with medical problems, I realized I was making a value judgement ... whether to make errors on the side of protecting human health or on the side of conserving state resources' Beverley Pagan (1982), cited in Brown, 1992

Citizens often experience major problems in stating their case. Research costs money, and it often takes some time and effort before anything is measured at all. Local groups often object to methods and quality of research. If violation of environmental standards is established, they may have a case. But if total loads of pollutants from different sources and compartments are too high, they usually don't have possibilities for legal action. Neither have they, when a health problem has been acknowledged, as long as they cannot prove that it is caused by environmental quality. Current methods and approaches are clearly inadequate to protect community health.
Brown (1992) points out that epidemiologists are more concerned with the avoidance op a Type 1 error, i.e. a *false positive* outcome, where the community members are more concerned about a Type 2 error, or a *false negative* outcome. To reduce the chance to miss a true effect, the sample needs to be increased, making the survey more expensive (Fisher et al., 1997). In case of local sources of pollution the exposed part of the population may be simply too small to detect a statistically significant effect. It would be fairer to the community to also give an estimation of the Type 2 error, i.e. the chance that the community is right about supposed health effects. There are methodological problems, of course, but it should be feasible to develop a procedure to at least give some indication.
Another approach is advocated in Rosalie Bertell's paper, i.e. a survey of biological indicators, rather than a survey of specific clinical syndromes (chapter 6). Wherever suitable indicators exist, such an approach has clear advantages. However, as Ashford and Miller state, biological indicators of health or environmental exposure are not always available (chapter 5). Yet it is certainly a direction for future research.

Tools for Empowerment and Sustainable Development

Access to information and justice and the right to participate in decision-making as proposed in the Ministerial Declaration will certainly contribute to empowerment of citizens. So will, if properly set up, the development of NEHAPs and LEHAPs. But implementation in such a way, that it really makes a difference to individual men, women and children often seems to be a problem. One problem, frequently

mentioned by citizens, is the need to balance between different interests (chapter 2, 10). What is needed, is more *coherence* in decision-making, on all levels, from the international to the national and the local level. Rosalud de la Rosa's contribution to this report gives an interesting process-oriented approach to achieve more coherence in political decision-making (chapter 13). De Man's contribution about energy saving, yet health-promoting designs for housing gives an eloquent example of co-operative effort in health and environment contributing to a sustainable and healthy lifestyle (chapter 14). For an individual's health, lifestyle may in fact be a more important factor than the state of the environment. Efforts to improve public health by promoting healthy habits therefore are certainly worthwhile. However, there may be a conflict between sustainable lifestyles and health. Butter (chapter 12) and Hamilton (1999) raise the point of women's health and wellbeing, which may be affected by transport policy. Some recreational activities, like tourism, skiing and scuba diving may be detrimental to the environment. And a healthy diet is not always compatible with a sustainable lifestyle. Jan Juffermans presents some ideas to promote both (chapter 15).
Very important to civil groups is access to research facilities in order to substantiate their point. The science shops do provide such access, and their position should be safeguarded against cost cutting (chapter 9). Civil groups may support each other by linking up into larger networks. It turns out, that social support such groups can give each other is also very encouraging (chapter 2). Social support is also one of the main ingredients of the Monitoring Network's design. The other is the elaborated, systematic method of assessing both health and environmental circumstances and central registration (chapter 11 This is not only a good precondition for self-assessment (chapter 10) but it also empowers *individuals* with the bad luck of being particularly sensitive to certain environmental circumstances.

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3. Waste Policy, Incineration and the Risk Issue in the Netherlands

Jan Eberg[1]

The first chapter of this paper describes waste policy development in the Netherlands as an interaction of social sectors. The second chapter policy development with respect to waste incineration and environmental health risks for both municipal and hazardous waste incineration.

1. Waste Policy and the Interplay of Social Sectors

1.1 The Four 'Estates'

Waste policy is not just a matter of government action. It affects many people in various settings, and is shaped by a variety of actors. A common way to indicate the different activities of the main groups of actors who are involved in policy processes, is by discerning institutional fields, or macro-organisational structures, or "legitimised social groupings" (Douglas 1987:46). Here, the term 'social sector' will be used.

The three most revered problem solving social sectors of our type of society are government, business, and science. A fourth, but politically not absent, sector is composed of social interest movements or non-governmental organisations (NGOs), which to a certain extent represent the will and voice of the public. From an economic point of view, the first three social sectors differ from the fourth one. This mainly finds its roots in the professional and societal position of their 'members'. Actors or adherents from social movements are not all employed by these organisations. Moreover, public pursuits lack the solid structure the other sectors seem to have. Also historically, one may point to a difference in status. As far as democratic political influence is concerned, social movements only emerged in the late 19th and in the 20th century. Conservation movements have existed since the beginning of industrialisation (Beck 1992:162), whereas today's environmental movement sprang up in the 1960s. In modern society's policy-making processes, however, all four social sectors exhibit political and cultural significance. The corresponding actors all perform their particular, yet distinctive, role. Together, these four 'estates', and the organisations they are connected with, are also present in waste policy processes.

In general, governmental actors are: state authorities (national, regional, local), rulers, officials, and other political representatives. There is no such thing as *the* government. We know, of course, of a central government, but this is composed of several Departments each having their specific concerns. Their rule of conduct, however, is the current governmental programme. Besides a topical division, there is also a structure of administrative layers. Again, interests, beliefs, and responsibilities of 'large scale' and 'small scale' government agencies may be quite diverse. Government is an important policy-making actor with a regulatory task. Regarding waste policy, (environmental) government agencies develop programmes, strategies, and instruments. In order to attain waste policy goals, they promote, co-implement, and control planning processes. For this, they co-operate with other social sectors and target groups. Examples are covenants with industries, assignments to research institutes, and negotiations with all parties involved. On the other hand, government also coercively steers waste policy, using compliance strategies, regulations, and technology forcing (Schot et al. 1994).

Business is the collection of commercial organisations. Their *raison d'être* is to engage in profitable enterprises. The diversity of businesses in agriculture, industry, and service is enormous, but somehow they are all dealing with waste, either producing it or (in)directly reducing it. Since environmental and waste policies became everyday considerations, business voluntarily or reluctantly adapted changing

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production standards. Strategies such as 'good housekeeping', environmental management systems, and pollution prevention have gained ground. However, only a small group of businesses can yet be

called pro-active. End-of-pipe solutions are still predominant, and there remain several cultural, organisational, technical, and economic barriers as well as innovation and diffusion problems (Cramer & Schot 1991) to meet ecological demands. Nevertheless, the environmental and waste business sector is growing.

Science has two main objectives: to increase knowledge, and to apply this at the service of society. Independent or 'value-free' science, however, is rare. Scientific knowledge is a one-sided structuring of reality (cf. Habermas 1968), which starts with the decisions on subjects and directions of science and technology. Besides information transfer and enhancing the quality of discussion and decision-making, research also has some side functions (Jaarsma & Mol 1994:121): it can be an alibi when defending unpopular policy decisions, it can pave the way for political compromises, and it can be a means to put hard decisions on ice. Principal performers of science and technology are universities, technological institutes, and (large) industries. Government has a steering influence but remains, like the general public, at the mercy of others. Although many technological systems cause waste problems, R&D and application of cleaner technologies aim to compensate them.

Social interest movements emerge when increased public awareness and anxiety reach a point where people are getting organised. This can be at a local, regional, national, or international level. Social movements are not as 'timeless' as the other big social sectors. They arise, change, merge, and fall apart in connection with the relative topicality of societal problems. Since ecological and waste problems have become apparent, many environmental organisations were founded. In modern democratic societies, environmental movements are institutionalised and professionalised, and have quite a voice. They do not only signal problems and put them on the political agenda ('whistle-blowing'), but develop alternatives as well, which are often scientifically based and can match those of business and government. Methods and strategies of environmental movements vary from conflict to consensus approaches. In waste policy processes, they strongly advocate prevention efforts, oppose pollution and health risks, and take action on matters of waste management infrastructure (including NIMBY protest).

The interplay of social sectors is an important vehicle of policy dynamics. In particular, interaction between government, business, and science will take many shapes. Also with respect to waste policy, all four 'estates' play their part in the construction and transformation of this policy area. Actors from these 'estates' can be aggregated to advocacy coalitions, which seek to increase their resources and to translate their beliefs into specific waste policy programmes. Besides, competing interests and beliefs of these actors are the principal cause for policy dissension.

1.2 Waste Policy

The total amount of waste in the Netherlands grew according to the social-economic development. Because of the heterogeneity and instability of different waste categories, time comparisons of total quantities are rather senseless (Tellegen 1989:35). In the 1990s, the total annual generation of waste streams is approximately 125 million tonnes (CBS 1994:63). This includes dredging sludge (about 65 million tonnes) and surplus manure (about fifteen million tonnes), which proceeds from the typical Dutch geographical and economic situation. In 1994, the production of municipal waste came to around ten million tonnes (AOO et al. 1995). The figure for hazardous wastes is about 1.5 million tonnes (cf. CBS 1994, VROM & IPO 1996).

> When, during the 1960s, the signs of pollution became alarming, government started to take action. This was the beginning of 'modern' environmental policy. In 1971, the Ministry of Public Health and Environmental Hygiene (VoMil) was established, which, after a year, issued the *Urgentienota* (Urgency Report). The Memorandum covered pollution problems in general. Ecological coherence was recognised as an important issue, but the policy angle at that time was very anthropocentric. In part two of the Urgency Report, the urgency programme, it was concluded that the existing Nuisance Act (1875, revised 1953), the Surface Water Pollution Act (1969) and the Air Pollution Act (1970) were not sufficient to meet waste problems. The earlier Soil Protection Act predesign (1971) contained rules on waste disposal. Critics, however, thought that waste disposal needed an organisational framework, rather than prohibitions. Therefore, the subjects of 'soil' and 'waste' were split (VROM 1984a:17). That was the beginning of what became two separate Acts: the Chemical Wastes Act (1976, Stb. 214) and the Waste Substances Act (1977, Stb. 455). Both acts stressed the efficiency of waste disposal. Originally, they were to be fused but the idea was abandoned to prevent delay. In 1994, the two waste acts were abrogated and incorporated into the Environmental Management Act.
> The Chemical Wastes Act (CWA) contained rules concerning chemical wastes (except from households) and exhaust oil. Which wastes were to be considered chemical wastes, was determined by the Substances and Processes Decree. Organisational rules encompassed systems for licensing, delivery, and notification. A trip-ticket was only compulsory for international transport. The CWA prohibited dumping, but the Minister could give an exemption for this. The law was not completely in force before 1984, and suffered from severe implementation problems, such as

> shortage of T&D infrastructure, poor control and enforcement of regulations, and insufficient financing. The government expected that private industry would engage in commercially profitable and orderly T&D. Although industry did, it became a failure. In 1973, the Induval Foundationwas set up to anticipate the legislative framework. Their landfill plan was rejected by the provinces and opposed by the national environmentalist group Nature and Environment. Two governmental commissions were appointed. The Hofman Commission (1980) recommended one central storage site, but this again encountered opposition. The plans of the Kolfschoten Commission (1982), eventually resulted in the foundation of AVR-Chemicals, which runs facilities for incineration and storage of hazardous wastes, but only after the interference of Minister Winsemius. Due to the many disappointing experiences, like the scandals involving EMK/Uniser and Booy Clean, the idea to merge the CWA with the Waste Act was heard anew. The Waste Substances Act (WSA) too was a framework act, relevant to those wastes which are not covered by the CWA, that is mainly municipal waste. It came into complete force in 1985. The WSA specified tasks for the central government, provinces and municipalities. Municipalities are ordered to collect the household waste (or have this collected) at least once a week. Provinces draw up a provincial waste plan (*Provinciaal Afvalstoffenplan*, PAP), which has to be revised every five years, stating how much waste gets off and how this is to be processed. They also grant the permits for landfills, waste incinerators, and other waste processing facilities. Concerning waste disposal, the WSA prescribes co-operation between municipalities within a province. Provinces and municipalities together are responsible for the planning and operation of waste T&D. The central government supervises the execution of the WSA and issues directives to the provinces, from which the provinces can deviate. The government can also draw rules by Order of Council to realise policy intentions. Despite this concept, it appeared that, during the 1980s, the material and organisational goals of the WSA were not satisfactorily met (Houben & Leroy 1993:12). Waste volumes were still rising.

The first hint for a change, was a motion from Second Chamber members Lansink et al. It was passed in 1979, and proposed a priority order for waste policy measures. The rank was: prevention, product recycling, material recycling, useful application, waste-to-energy, secured landfill. This scale is also known as Lansink's ladder or the ladder principle, and still plays a key role in many policy programmes.

After a rather *ad hoc* start, waste policy became more and more part of environmental policy as a whole. In 1982, the Ministry of Public Health and Environmental Hygiene changed into the Ministry of Housing, Physical Planning, and Environmental Management (VROM). The policy approach became less anthropocentric. Besides, the very perception of environmental problems changed, which substantially broadened the definition of their scope and complexity. The compartmentalised planning systems, however, ran into juridical difficulties. Environmental problems appeared to be coherent, whereas environmental management was disjointed. Problems were shifted, rather than solved. This called for a pursuit to seize at the source of problems, and to integrate implementation.

> During the 1980s, the improvement of the waste management structure became a major concern. Policy integration and waste prevention were main strategies. Integration of the two waste acts was shaped by the General Environmental Provisions Act (Wabm, 1979), and eventually by the Environmental Management Act (Wm, 1993). In 1987, the National Environmental Advisory Board again urged the necessity of waste prevention (CRMH 1987). In response, the Waste Prevention and Recycling Report was released. The report gives a list of 29 priority waste streams, and dictates policy targets for the year 2000. Prevention should reduce ten percent of the waste streams, and recycling should be increased from 35 to 55 percent. To attain these goals, the organisation of waste management was restructured. A first impulse came from an inter-governmental report in 1986. The conclusion was that there was a lack of consensus between the levels of government concerning waste policy goals. After another report on the future of Dutch waste incineration facilities (Tebodin 1988), the three government organisations formed the National Waste Policy Coordination Committee (LCCA) to elaborate these future plans. A special committee was established for hazardous waste policy. The LCCA recommendations (LCCA 1989) resulted in the inauguration of the Waste Management Council (AOO) in 1990. The AOO is a national forum of waste policy actors, composed of representatives from provinces, municipalities, central government, environmental and consumers' associations, business, and science. The main responsibility of the AOO is the organisation of waste management on a national scale. Their planning results are laid down in Ten-Year Programmes on Waste Management (AOO 1992, 1995a). The broader integration of waste and environmental policy ensued from the Environmental Policy Integration Plan (1983), and the policy report "*Meer dan de som der delen*" (1984). The objective is to achieve coherent policy regarding environmental compartments (internal integration), governmental Departments (external integration), and regarding administrative levels and target groups. The sectoral IMPs (Indicative Multi-Year Programmes) were combined into one IMP on environmental management. Environmental policy was formulated as a twin tracks strategy of both curative and preventive measures, seizing at effects (substances, areas, themes) and sources (target groups). Policy intentions became embodied in operational and strategical plans. The latter are known as the National Environmental Policy Plans (NEPPs).

The NEPPs and the Environmental Management Act represent the endeavour towards environmental policy integration. This has been more successful than the efforts concerning waste prevention. Despite the summons of environmental organisations, outcomes of research and demonstration projects, and policy intentions in several white papers since the release of the Urgency Report, substantial waste prevention results have been poor (AOO 1992). Recycling and useful application results, though, were much better, reaching 35 percent in 1986 (VROM 1988:9), and approximately 60 percent in 1994 (VROM 1994:4). Nevertheless, the actual waste management picture for a long time resembled a 'reversed Lansink ladder'. Except for prevention, of which the goal for 2000 has been reset to six percent (DHV 1993), the ladder is slowly turning upright. An important impulse for this was a landfill prohibition for 32 waste streams which came into force in 1996. With respect to municipal waste processing, landfill has

always been a principal means of disposal. Its part slowly dropped from about 80 to about 35 percent. Roughly, incineration grew from fifteen to 40 percent, composting from five to 25 percent. With an annual growth of two percent, the aim is to further increase composting and recycling, to increase incineration, and to eventually limit landfilling to a minimum (DHV 1993, AOO 1995a). In this context, incineration and landfilling refer to residual waste. Figures for hazardous waste are even more difficult to give. Definitions have changed, statistics have been quite unreliable, and methods other than internal processing have been practised on a large scale. In 1990, there was no significant prevention, and the rates for recycling, incineration and landfill were about equal. The goals for 2000 are thirteen percent prevention, 40 percent recycling, 27 percent incineration, and seventeen percent landfill (VROM 1993).

1.3 Keeping up Appearances

Dutch waste policy shows signs of 'window-dressing', that is, it seems to be right or reasonable but it also has some demonstrable shortcomings. Besides the many merits of today's environmental policy, there has been a number of disappointing results. Achievements do not meet the ambitious goals (cf. Wintle 1994). On the one hand, environmental policy has become considerably professional and procedural, whereas on the other hand there is a gulf between the policy intentions on paper and the policy impacts in practice. These mechanisms are described as 'legitimation by procedure' (Luhmann 1983) and 'implementation deficit' (Mayntz et al. 1978). This is not specific to the Netherlands. Many other countries care much less and perform much worse. Nevertheless, the Netherlands is often portrayed as an avant-garde country regarding environmental policy, particularly in view of their policy programmes and spending. Many Dutch policy-makers would agree, but examples show that this might in fact be a 'false pride'.

For a long time, Dutch environmental policy lagged behind. During the 1970s, legislation developed slowly. It took a long time until the waste acts were fully operative. The Soil Protection Act, which started as a predesign in 1971 from which 'waste' was split off, was not in force before 1987. It was preceded, though, by an emergency Soil Clean-Up Act in 1983. The reason for this interim act, was the Dutch 'Love Canal affair' in Lekkerkerk (1980). Lekkerkerk was just the tip of the iceberg, and not the first case (cf. Wynne 1987, Buisman et al. 1991, Keus 1992). Moreover, not only residential areas appeared to be polluted, also former gas works premises, former dump sites, and countrysides. Despite the fact that legislation and control improved throughout the 1980s, many other hindsight experiences afflicted Dutch waste and environmental policy. There have been several similar affairs of illegal waste exports, waste dumping, careless pollution and other offences involving, among others, Cindu, Zegwaard, Kemp, Budelco, and Shell (cf. Didde et al. 1989, Knoop 1991, Glastra van Loon 1993, Van Vugt & Boet 1994). In all these cases, governments were accomplices. Furthermore, there have been and/or are problems with the policy regarding the surplus of manure (cf. Frouws 1993, Termeer 1993, Bloemendaal 1995), with environmental instruments such as subsidies (Vermeulen 1992) and covenants (Van de Peppel 1995), and with emissions from municipal waste incinerators.

One of the principles of Dutch waste policy is the 'polluter pays principle'. However, there are several cases that prove the reverse, i.e. in which the polluter gets paid (Vermeulen 1992, cf. Glastra van Loon 1993). Another principle is the 'proximity principle': waste should be processed as close to the point of generation as possible (though not necessarily in the country itself) in order to limit transportation. Still, the annual export of hazardous waste has been about 150-200,000 tonnes for years (Korver & Ponsen 1989, Greenpeace 1991c, Mulleneers 1992), and this even used to be more (Wynne 1987:87). It went to places all over Europe.

According to Gijswijt and Van der Vliet (1993), the ideology behind the environmental policy of Dutch governments reflects a technical pragmatism, and the Dutch parliament exerts little influence on dealing with the ecological issue. They also refer to the research of Van der Laan and Nentjes (1992), who conclude: "The Netherlands has the name, or thinks to have the name, for sticking its neck out with environmental policy. But how real is this picture? On a ranking of ten European countries, based on the qualities of 'environmental pressure', 'waste emission', and 'carefulness', the Netherlands is at the bottom" (cf. De Koning 1994:192).

There seems to be a cautious attitude of Dutch policy-makers towards business. The Netherlands tries to consider the economic circumstances of target groups more than other countries. The reason for this would be that, in the Netherlands, environmental costs weigh heavy upon trading results, and are more difficult to pass on to clients. As a result, environmental and waste policy appear to be flexible (e.g. exemptions from permit obligations), and the effects not straight (e.g. covenants as compromises).

The main cause of all these troubles is threefold. First, the Dutch physical and social geographical

structure. The country is densely populated, and has a relatively large amount of polluting industries. Second, a lack of governmental initiative, especially during the 1970s. Waste T&D was largely left to private companies, and there has always been a strong industry lobby against environmental regulation (cf. Wynne 1987, Van Noort 1990). Third, incapability and ignorance of regulatory authorities. Many cases show that interests are entangled, control has failed, and much is being tolerated and condoned (Houtsma & Van der Schot 1992, Reijnders 1993). This enables waste crimes to take place.

On the whole, Dutch environmental and waste policy is moderately sound. Recent outcomes contain successes, and influences of the environmental movement have become noticeable. Yet, there are still many countervailing forces and obstacles transferred from failures in the past, and relatively speaking, environmental quality has not become as well or is not as much improved as was presented by environmental policy. After a period of widespread attention, environmental affairs turned into a non-issue in Dutch politics (Hoppe 1994). The main reasons Hoppe mentioned for this were a downfall economy and a slackening debate. Nevertheless, despite a since recuperating economy, the debate was still poor and the issue did not gain priority. Are these signs of the so-called 'environmental fatigue'? (or, in terms of Downs's "issue-attention cycle": the gradual decline of intense public interest). Or, has the issue become quite current now, meaning that changes for the better need less attention? To a large extent, this again is a general development in modern industrialised economies. But in the Netherlands, this might be the result of the cautious but not always successful politics of a pluralist society. It seems that, also regarding the environmental issue and waste problems, the Dutch characteristics of lenience and tolerance prevail.

1.4 Concluding Remarks

Policy-making, including waste policy, implies an interplay of social sectors. As Solesbury (1976:383) put it: "The public debate about the agenda of environmental issues is largely conducted within and between political institutions". During the last three decades, all aspects of waste policy have changed: the perception of waste problems; the goals, strategies, and instruments of waste policy itself; the role of the social sectors and actors involved; and the interaction processes between these actors. The correspondence between these changes seems to be a shift towards more coherence and co-operation.

Waste problems became part of general environmental problems. They manifested itself as omnipresent, both visible and invisible, cross-media problems, for which mere clean-up activities are insufficient. Not only the effects but also the sources of pollution have to be taken into account. Weale (1992:28) remarks: "The persistence and intensification of old pollution problems and the growth of new issues provided the occasion for a new politics of pollution to emerge in the 1980s". The policy view moved in the direction of a less anthropocentric rationality: from environmental hygiene with an emphasis on public health, to environmental management stressing the coherence between disturbances at different places and times. Due to the scale of ecological deterioration, environmental and waste policy have become more international. Most European governments agreed to implement EC Directives, and many of these and other countries participate in UNEP summits and international treaties. From the mid 1980s, sustainable development and ecological modernisation became new goals. Policy strategies and instruments are guided by integration and prevention efforts.

The social sectors involved have been influenced and 'greened' by environmentalist ideas: government as legislator, facilitator and administrative supervisor; science as innovative supporter and provider of cleaner technologies; business and public as target groups which are slowly changing their behaviour. The environmental movement, as the originator of 'green' ideas and strategies, in turn took over qualities of the other social sectors and became more bureaucratic and professional. Environmentalism has firmly gained ground, and according to Paehlke (1989), it will become the fourth main political stream in the West, next to liberalism, conservatism, and social-democracy. This can be questioned, for it appears that environmentalism is being incorporated in the classical ideologies, and 'green' parties have expanded their single-issue to advanced social-environmental political programmes. The environmental movement, however, no longer dominates the discourse on the environment (Eder 1996). As a result, the political attention to the environmental issue has become less polarised, and one can even say that the views on environmental policy are converging and will meet in a common pursuit of ecological modernisation. Yet the debate about ideologies of development shows this to be still far away.
The 'greening' of government(s), industries, science, and public has induced two major changes. First, each social sector now has its environmental division and waste subdivision. Many people today are occupied with waste planning, waste business, waste research, and public interests concerning waste. Second, these actors meet in clusters organised around common environmental and waste issues. As waste policy developed, the relationships within these clusters became more and more interdependent, while specialisms became less self-evident.

2. Waste Incineration and the Risk Issue, Policy Changes in the Netherlands

2.1 Municipal Waste Incineration

The Netherlands is a small country. Yet, in Rozenburg (near Rotterdam) one can find the world's largest municipal waste incinerator. It is run by AVR (*Afvalverwerking Rijnmond*), and at present has an annual capacity of more than one million tonnes. This is as much as the total Dutch capacity in 1972, and about one third of all the municipal waste that went to incinerators in 1995. During the 1990s, some other large MWIs were built, but AVR has remained the biggest.

The total incineration capacity of all AVIs was built up to approximately 2.8 million tonnes in 1988. By the time of 1994, this figure was still about three million tonnes, although there were less facilities. From then on, total tonnage climbed to about four million tonnes in 1996. Two more AVIs and some extension of existing incinerators will raise this annual capacity to about five million tonnes in 1998.

Today, all AVIs except for Roosendaal produce electricity, whereas in earlier days especially the smaller ones did not. Electricity production has been steadily increased during the time span of the third generation of municipal waste incinerators. In 1982, the contribution to the national electricity generation was 0.85 percent (VROM 1984a:62). Between 1987 and 1991, this contribution doubled (Quakernaat et al. 1994:250), and in 1995, the electricity production of all AVIs had increased sixty percent in comparison with 1990, mainly due to the improvement of the efficiency of energy recovery. Since 1994, a new steam turbine at AVR doubled the capacity of their power station. The share of AVIs in the national production of electricity is now nearly three percent. Besides the energy return rates, the application of air pollution control systems has increased. This has been quite a difficult task though, for many AVIs had trouble meeting the emission standards and the investments that had to be made were very high, especially for large incinerators. The flue gas cleaning facilities of AVR and AVI Amsterdam cost 400 million and more than half a billion guilders respectively. This has had evident repercussions on the incineration tariffs, and subsequently on the public waste charges.

With respect to the advocacy coalitions in this subsystem, the AVIs are part of the Thermal Recycling Coalition, together with the Waste Processing Association (VVAV), and other actors from the waste processing sector. There are two other coalitions as well. The Incineration Prevention Coalition consists of mainly environmental organisations (the Foundation Waste and Environment, A&M; the Netherlands Society for Nature and Environment, SNM; Greenpeace; and the Dutch Friends of the Earth, VMD), political parties (chiefly *Groen Links* at the national and local level, and the *Groenen* at the local level), and critical members of science. Members of the Incineration Supervision Coalition are the Ministry of Housing, Physical Planning and Environmental Management (VROM), provinces, municipalities, the Waste Management Council (AOO), the National Institute of Public Health and Environmental Protection (RIVM), and several (other) science actors. Although beliefs of members from different coalitions are quite distinct, relationships between different coalition actors are consensual and kind-hearted.

During the years of waste policy development, there has been an increasing governmental participation resulting in an inter-institutional structure, whereas technology has been changing according to foreign - predominantly German- standards. Waste incineration itself has been the subject of many discussions, in the 1980s because of dioxin emissions, in the 1990s mainly in relation to capacity planning.

2.2 The Risk Issue: Theory and Practice

The Lickebaert Affair

Policy-making and technology development regarding air pollution control have been strongly influenced by knowledge about the relation between waste incineration and dioxin emission. In the Netherlands, this issue dominated the 1980s, and led to the Lickebaert affair. Lickebaert is the name of a pasture area near Rotterdam, between Vlaardingen and Maassluis, and northeast of AVR. Relatively high concentrations of dioxins were found in the milk of cows from this area. It pointed to a direct relation between waste incineration and health risks. The story begins with research carried out by chemists from the University of Amsterdam (UvA). In 1977, they found that municipal waste incinerators emit dioxins. Their research was extended and the results published in 1980 (Lustenhouwer et al. 1980). With this report, a political debate started that was to last until 1989.

In the years 1989 and 1990, three developments culminated: scientific research incontrovertibly proved that cows from the Lickebaert area contained dioxins, new Incineration Guidelines (including dioxin emission standards) took effect, and AVR began building its flue gas cleaning system. The description of the preceding developments breaks down in the three corresponding parts: research, incineration guidelines, and AVR.

Research

The Department of Environmental and Toxicological Chemistry of the University of Amsterdam proposed to continue its research from 1980 with an inquiry into the effects of dioxin emission on man and animal. The hypothesis was that dioxins would appear in the milk of cows grazing near AVIs. The proposal was rejected by VROM. The Ministry first wanted to have the exact emissions measured (Torenvlied & Jakobs 1994:109), which can be understood in the light of the dissension about the toxicity of dioxins. Further research was required. Subsequently, it took two years to establish a research programme, including projects regarding emission (TNO), the generation and decomposition of dioxins (TNO), immission (RIVM), and toxicological aspects (CLM). Coordination was in the hands of the Ministry's own research institute, the RIVM. The UvA was not involved. The official reason was that the government thought this was not to be done by universities but by semi-governmental research institutes (Jakobs 1991:27).

More delay followed and because of a rising stream of new information, partly due to extension of the research projects, partly to the improvement of monitoring equipment, the whole issue became increasingly complicated. Also, the UvA researchers continued their 'effect studies', which in turn were repeated by TNO and RIVM (Jakobs 1991:30). Yet the emission studies dominated. Eventually, policy-makers succeeded to avoid the need for decisions by blocking and slowing down the execution of scientific research until 1989 (Torenvlied & Jakobs 1994:110).

In that year, the affair reached its peak. One year earlier, Mr. Van der Kooy, stock farmer in the Lickebaert area, noticed a strange behaviour of his cows and contacted the Research Centre for Agriculture and Environment (CLM). Samples were tested at the UvA laboratory and countertested by the RIVM. They appeared to contain high percentages of dioxins. These results (Liem et al. 1989) at least accelerated the completion of the RIVM research programme (Sein et al. 1989), which had found indications for follow-up research on dioxins in cattle milk on the basis of its emission project. Conclusions of both investigations confirmed each other, and were reported together in July. Parliament

was shocked.

After the affair, research continued under the heading of "monitoring of dioxins in cow milk", and was extended to all AVIs. Eventually, the Lickebaert area appeared to have been the worst place. Milk, milk products, animal organs and meat from this area have been subjected to selling restrictions until the end of 1994.

Incineration Guidelines

From 1982, AVIs were subjected to the permit system of the Waste Substances Act. In 1981, emission control of AVIs consisted of only E-filters. In 1985, an Incineration Guideline was established in order to push back air pollution from AVIs. This *Richtlijn Verbranden '85* (RV '85) applied to new facilities only, and contained no dioxin clause. Retrospectively, this RV '85 had no impact really. In 1989, still all AVIs only had E-filters, except for the ARN which was built in 1987 and had both an E-filter and a wet scrubber.

By this time it became clear to VROM that "foreign experiences show that very low emissions can be realized", it was announced that the RV '85 was to be replaced by stricter guidelines. The establishment of emission standards is a political process with many sides. Determining the feasibility of emission standards depends on the urgency of the problem (which is assessed on the basis of political pressure both pro and con), the state of scientific knowledge, the state of emission technology, and the economic and financial consequences. Eventually, all factors have to be weighed against each other. The Ministry consulted both the incinerators and environmental organizations about the contents of the new guidelines. During the Spring of 1989, the standards for many substances were still relatively flexible, whereas dioxin was still not included. The Lickebaert affair had by now reached its climax. According to former SNM policy executive, Mr. Klingenberg, the draft of the RV '89 from a few months before was thrown in the garbage can. The new text contained more stringent standards and included one for dioxins. "This shows that the norm setting was a political, not a technical process".

The definite RV '89 (VROM 1992c) was fixed in August, one month after the Lickebaert crisis. It encompassed not only more severe emission standards, but also guidelines for the building of an AVI, for managing the incineration process and all constituent parts of the facility, and for monitoring waste amounts, emissions, and incineration parameters. All AVIs had to comply to the emission standards of the RV '89 before December 1993, and to the whole Guideline before January 1995. In 1993, the Incineration Guidelines have been converted into an ordinance. This was the Waste Incinerators (Air Emissions) Decree or BLA (*Besluit Luchtemissies Afvalverbranding*). It came into force immediately for 'new' AVIs: those which got a permit on or after the first of April 1990. For existing AVIs, those which got a permit for operation or building (like AVI Amsterdam) before that date, the BLA was to be met from 1995. Since the BLA, the pendulum seemed to have swung back again when, partly due to lobbying activity by the incinerators and the VVAV, several obligations were mitigated and many provinces tolerated higher dioxin emissions.

AVR

With reference to the UvA research of 1980, questions were asked about dioxin emission at AVR. At first, the board of Rijnmond, the joint municipalities in the Rotterdam region, denied that the AVR issued dioxins at all. However, the board was not quite easy about the case and had its Environmental Control Body (DCMR) analyzing fly-ash from AVR. The conclusion was that there was nothing the matter. Still, Rijnmond doubted and wanted to pursue further analyses, but this was prevented by Minister Ginjaar (Vomil) because the Ministry was preparing a research programme itself (Jakobs 1991:25).

AVR was one of the AVIs that were investigated by the RIVM, together with ROTEB and VVI Alkmaar. The three AVIs incinerated half of all Dutch municipal waste and were thought to well-represent all AVIs. The final conclusion was that milk from the Lickebaert area was unacceptably contaminated, and research indicated that on the basis of emissions from AVR the TDI (tolerable daily intake) norm for dioxins could be exceeded. This was hard to prove, for it was estimated that only 30 percent of the background dioxins in the Netherlands are Dutch; the rest drifts in from sources in other countries (Gourlay 1992:156). Nevertheless, it was known that during the 1980s AVIs caused 80 percent of the total dioxin emissions (Van Broekhuizen 1992:37), and in 1988 the dioxin emission level rose to a height of 200 grams TEQ in the Rijnmond area (DCMR 1994:17). Action against the offence of AVR was considered, and in December 1989, AVR was summoned to appear before court. The state demanded financial compensation and adjustments to prevent dioxin emissions.

At that time, AVR had already modernized its ovens which meant that the incineration process had become less deviating and, hence, less dioxins were produced. Yet the AVR was directly involved in the Lickebaert affair and had to face a troublesome situation. It must have been a combination of factors that

caused the AVR to stay in business while during the years following the Lickebaert affair four small AVIs were shut down. One reason could have been AVR's elaborate communication strategy (Chevalier 1991). More important was what Mr. Joosten, head of the Wastes and Emissions Department at RIVM, elucidated: "The policy at that time already was to plan towards an infrastructure that comprises large facilities. This was even reinforced by the fact that investments for flue gas cleaning can only be afforded by large AVIs".

One year after the Lickebaert affair, AVR signed a contract with the Austrian company SGP-VA (now AE&E) for the building of the flue gas cleaning facility. At the end of 1994, all lines were operative. According to TNO, the installation complies to all emission standards.

All efforts by AVR, VROM, and other actors involved were not, however, enough to prevent a second affair which showed all signs of being a copy of the Lickebaert case. This affair took place in Gelderland, in 1995, and featured the AVIRA incineration facility. Dioxin concentrations found in the sheep of Mrs. Ketz were comparable to the values of the Lickebaert cows. According to Dr. Koppe, who cooperated in the research, there had to be a relation with the (fly-ash) emissions of the nearby waste incinerator. The provincial environmental federation had warned about this several times, but these warnings were ignored. Greenpeace and A&M alarmed the province, but the provincial authority did not take action before repeated measurements proved emission standards had been exceeded. Eventually, one of the ovens has been temporary closed. The AVIRA affair was another example of tolerance policy. It did not rouse the whole country though. Apparently, the issue had moved up one or two stages in Downs' (1972) "issue-attention cycle".

The Weight of A Sugar-Bag

In theory, waste incineration is a process of the 'old' elements of nature: with the help of fire, waste is turned into earth (solid residues), air and water (emissions). At least, that is how the process was depicted at the opening reception of AVI West, in Amsterdam, June 1993. In practice, however, a whole array of chemical elements as we know them today is involved. Also in theory, air pollution control systems are supposed to work well and to clean flue gases properly and continuously. In practice, however, and that is from the time these systems were indeed applied, failures occur and regulatory standards are not always met. It are the different emphases on either theory or practice that coloured the Dutch dioxin debate.

AVR has never been happy with the way the company was portrayed as the chief offender in the Lickebaert case. They felt 'scapegoated', and in turn blamed the University of Amsterdam for making too large a fuss of it all.

> "The University of Amsterdam has played a questionable and rather simple-minded role in this affair [-]. Waste incineration is just one of many industrial activities that generate dioxins, but so do other processes, cars, barbecues, home fireplaces etc. And we were not the only issuers in the Lickebaert area. [-] And as I said, we cannot deny the emission of dioxin, although, on a yearly basis of one million tonnes of waste, it is just the amount of a sugar-bag, a few grams." (L. Chevalier, head of the Public Relations Dept. at AVR, interview).

For members of the Thermal Recycling Coalition, the whole dioxin debate including the related risks of waste incineration, indicated a rather 'theoretical' discussion, as if it concerns something 'unreal'. This is best illustrated by the way AVR managing director Mr. Steenhuis put it: "Consider this sugar-bag. If we would grind it to very little portions, so small that everyone in the world could be given an equal portion. Then everyone would get about one tenth of a nanogram, which is the emission standard for dioxins. That is unimaginable, so small". The dioxin issue is clearly trifled with by this coalition.

The Incineration Supervision Coalition had to account for different matters involved. Public health and environmental quality had to be protected, but also the disposal and processing of enormous amounts of waste had to be ensured. Concerns about the organisation of waste management and the risks of waste incineration were in conflict. Hence, research was assigned to win time, incineration guidelines and emission standards had to be established on the basis of consensus, and AVR had to be reminded of its responsibility.

> "The University of Amsterdam roused the press by saying that the dioxin emissions were rather high. We did not follow that conclusion. To what extent this was thwarted by 'politics', I cannot say. I do know that, before any figures about dioxin emissions at AVR came into the open, there had been numerous meetings where all kinds of interests were at stake. At that moment, the complete waste incineration business was under discussion. It was evident, that if the measured values were too high, that would cause a chain reaction. And then what? You have to go somewhere with the waste, you know. That is when the matter was protracted, and additional research was commissioned". (J. Joosten, head of the Wastes and Emissions Dept. at RIVM, interview).

Environmental organisations of the Incineration Prevention Coalition remained sceptical and critical, despite some revolutionary changes shortly after the Lickebaert affair. Acceptance and improvement of

air pollution control was finally reached, and even the incinerators had to admit that there were indeed technological possibilities to meet strict standards. But this was not a guarantee of uncomplicated operation. For example, the new AVI Amsterdam had troubles connecting additional stages of flue gas cleaning systems because their original design became out of date when the RV '89 was released and the dioxin norm had to be met. Linkage of existing flue gas cleaning components constitutes more uncertainties than designing and constructing a total concept from scratch. It later turned out that there have been several problems with air pollution control at the AVI Amsterdam.

Greenpeace and A&M argued that the BLA must be construed as setting a 96 hours norm for the whole facility, not per oven. Otherwise, it would be possible to compensate failures with a large number of ovens. "As if 20 ovens means that people in the surrounding area can tolerate 20 times as much dioxins". The provincial authority argued that 96 hours for the whole facility would aggrieve AVIs with a larger number of ovens than others. AVR would only be allowed a few hours of unusual event per oven per year, which would mean a disadvantage for the Rijnmond area with its higher need for incineration capacity than, for instance, Amsterdam. On the other hand, the theoretical exceeding time of 576 hours for six ovens "will most probably not be reached in practice".

Besides the discussion about risks from air emission, there has also been a harsh debate about the use of slags. Since 1995, there is a Building Substances Decree that regulates this. It has a special category for AVI slags which are allowed to be used when extra provisions are made. The Incineration Prevention Coalition is not at all happy with the Decree.

> "It legitimises the diffusion of hazardous substances in the environment. Lixiviation cannot be avoided, not even by immobilisation, because in the course of time the material will erode. And so by spreading the substances, the problems are being enlarged. The only solution would be to treat the slags and other residues, and remove the heavy metals. This is expensive, but so is immobilisation. Treatment, however, prevents future risks and that should be more important than discussing what the financial consequences are for now". (A. Schoevers, board member and spokesman of A&M, interview).

Mr. Schoevers put into words what, especially, SNM already advocated for years (cf. Klingenberg 1990, 1992), that is to pay special attention to environmentally hazardous substances, for they could pose imperceptible but severe long-term risks. These risks may increase when more slags are produced and diffusion of toxics is not prevented.

The Risk Issue showed that the policy positions, and especially the instrumental beliefs, of the three coalitions remained different all the time. The margins of dispute might have become smaller, but not the distance between the angles of vision.

2.3 Policy Change

In the past three decades of waste management and waste incineration, there have been quite some changes, both for the AVR and for the national waste management system. After a more or less problematic start in the 1970s, AVR came through very well. They survived a suspension of payment, remained rather intact after the Lickebaert affair, managed to pass several cases before the State Council, got its flue gas cleaning technology right, strategically exerted its influence to secure full capacity, privatized, diversified, internationalized, and continued operation as the largest waste incinerator of the Netherlands.

The national waste management system has matured over the years, but is still in a state of flux. In the 1970s, incineration was predominantly a local issue. Much waste was landfilled. Dioxin problems were not yet manifest, and there were organizations for the protection of nature who favoured the building of AVIs over having more and more landfills.

During the 1980s, waste policy had to contend with serious problems. This was the decade of Lekkerkerk (1980) and Lickebaert (1989). Besides municipalities, also the provinces and central government became actively involved in waste policy issues, but this at first caused policy fragmentation. At the same time, the 'volume' of planning, regulation and implementation was expanding. Yet there was opposition, and the responsible government actors had to cope with the policy dilemma of continuous available disposal provisions with sufficient capacity, hampering prevention and recycling. The unravelling of this 'policy knot' started when some people initiated the discussion about the future organization of waste management which led to the LCCA and AOO.

Meanwhile, incineration capacity gradually increased and so did the anxiety regarding pollution by AVIs. The period preceding the Lickebaert affair reflected a situation of political deadlock. Business (i.e. the incinerators) delayed regulation, while government delayed research on the effects of dioxin emissions.

Research was used to put hard decisions on 'hold'. Even environmental organizations had trouble breaking through. It was as if the government was jammed between the opposite political influences of incinerators and environmental organizations, and left paralysed. Eventually, it was the individual action of a farmer who had his milk tested, that ushered the change. The eventual yet rapid introduction of the stringent RV '89, was linked to two situational aspects. First, the dioxin affair became national news just prior to an election for parliament. This meant that government parties, once they were held responsible, were not at all unwilling to embrace the affair as something they could handle. Also the Ministry of VROM could 'score'. Second, the state of the economy was improving during the late 1980s, so investments in construction projects could be made without hesitance. In that sense, the Lickebaert affair was a 'policy window' or 'window of opportunity' (Kingdon 1984) to push regulation: social pressure, scientific knowledge, political opportunities, technological possibilities, and economic willingness all came together.

Substantial changes really occurred from approximately 1990. The AOO was established, the VVAV intensified its policy activities, A&M entered the policy stage, and environmental organizations more often fine-tuned their actions. Besides, more information on waste arisings and the composition of waste streams was disclosed, regulations had serious effects (emission standards, separate collection of organic kitchen and garden waste, landfill prohibitions), and policy actors became interested in new processing technologies. An important change was that waste T&D was rearranged on a larger scale. Some AVIs were shut down and some planned ones cancelled. Societal resistance and new insights regarding capacity need were contributing factors, but most probably, it appeared to be necessary to reorganize the incineration infrastructure into a limited number of large AVIs which would have a total capacity that fits with an efficient waste disposal system.

A close look at the state of things around the mid 1990s, reveals that the total incineration capacity was sufficient, although there were still problems to direct combustible waste to the AVIs. A landfill prohibition for combustible waste apparently does not work well without a proper system of balancing processing tariffs. Furthermore, in 1995, air emissions by AVIs were significantly reduced compared to 1990. The decline varied from 64 percent for NOx, to 99 percent for dioxins. Additional regulation will ensure that also the quality of solid residues poses less risks to public health and the environment. Future processing technologies, either thermal techniques or other systems, will therefore be cleaner. Another recent result is that in 1995 the total annual volume of end-processing (waste at landfills, incinerators, and composting facilities) had dropped for the first time. It seems, therefore, that improvements in efficiency and recycling become effective.

The policy positions of the three advocacy coalitions remained diverse, but have sometimes been quite similar to each other. There were even policy positions on which all coalitions seemed to agree, whereas these obscured the underlying differences in beliefs. In the Risk Issue, a common belief was that slag quality should be regulated; for the IP coalition, this will prevent dispersion of pollution through the environment; for the TR coalition, this allows slags to be re-used as secondary resources; for the IS coalition, this will prevent slags from being landfilled. But although the IS coalition met the other coalitions on their policy positions, i.e. the IP coalition by pursuing regulation, and the TR coalition by facilitating the recycling of incineration residues or tolerating delayed compliances, specific differences remained. One general distinction is their time scope, which differs from relatively short (the pragmatic view of TR), to middle-range (the strategic view of IS), to long-term (the idealistic view of IP).

2.4 Hazardous Waste

> "The main feature of the Dutch system has been the severe shortage of any significant treatment and disposal infrastructure, despite early legislative action and relatively precise and rigorous formal regulations".
>
> Brian Wynne; Risk Management and Hazardous Waste, 1987:86.

In the Netherlands, there is one national facility for hazardous waste incineration. This is *AVR-Chemie* (AVR-Chemicals), one of the AVR companies (*Afvalverwerking Rijnmond*), located in Rozenburg. Surrounded by the heavy industry of the area of Rotterdam and the world's largest industrial harbour, it plays an important role in the processing of hazardous wastes from Dutch industries since the beginning of the 1970s. To a great extent, this concerns waste from small and medium-sized industries.

As far as it can be estimated, the total annual amount of generated hazardous wastes has grown from approximately one million tonnes to approximately two million tonnes in the last three decades (CRMH 1979:111, VROM 1984b:8, cf. CBS 1994:70, VROM & IPO 1996:19). The composition of the total hazardous waste stream has fluctuated though. On the one hand, several constituent streams have

ceased to arise because of changed production processes. On the other hand, new streams were generated, and the collection of hazardous wastes has improved, due to an increasing willingness of business and households to deliver their (small) chemical waste, and to better regulation, control and enforcement.

Treatment and disposal of hazardous waste was regulated by the Chemical Wastes Act (CWA) of 1976, which has been incorporated in the Environmental Management Act in 1994. Hazardous wastes are indicated according to the Hazardous Wastes Indication Decree (BAGA). This contains lists of processes and substances (since 1981), and of exceptions (since 1991). Hazardous waste may only be delivered to authorised companies, i.e. that have a licence. Deliverance and acceptance must be registered by the concerning companies, and have to be notified to an organisation that is appointed by the provincial authorities. Today, every transport must have a trip-ticket. International transports are subjected to the European Waste Transport Ordinance (EVOA), and agreements of the Basel and Lomé-IV Treaties.

The number of processing techniques for hazardous wastes is growing, mainly due to the wide range of specific waste streams. In general, processing is ordered by the ladder principle. However, a considerable amount of hazardous wastes is non-processable. These hazardous wastes have first been categorised according to the findings of the Hofman Commission (1982). Later, the definitions of the categories containing heavy metals were actualized (VROM & IPO 1993, 1996):

- C-1 wastes are so toxic that storage in a C-2 landfill is not possible (predominantly mercury waste).
- C-2 wastes are non-processable and strongly lixiviating, solid inorganic hazardous wastes (e.g. flue gas scrubbing waste, fly-ash), which can only be landfilled if control measures and provisions are such that percolation can be prevented.
- C-3 wastes are non-processable but slightly lixiviating solid inorganic hazardous wastes (e.g. slags from hazardous waste incineration, asbestos waste). Also these wastes require special landfill conditions.

The difference between C-2 and C-3 wastes is determined by lixiviation standards. For the C-2 and C-3 categories, there are storage sites at the Maasvlakte (Rotterdam region).

Not all hazardous waste generated in the Netherlands is processed internally. At least a part has always been exported, mainly to the FRG (especially the former GDR), UK, Belgium, and France. Although exports of hazardous waste are a substantial part of Dutch waste policy, this case concentrates on processing of hazardous wastes in the Netherlands. From what is processed domestically, a part is treated by generators themselves. Another part, which has grown especially during the 1980s, is processed by private hazardous waste T&D companies and by AVR-Chemicals. The former mainly perform chemical/physical treatment, the latter is an end-processor. In 1996, AVR-Chemicals had three rotary kilns, and a C-2 storage. At that time, the total hazardous waste incineration capacity of these three ovens was 135,000 tonnes/year. One of them is rather old and has been modified, the other two are quite modern. Only the modern ones produce electricity, the first starting in 1986. The C-2 storage has a capacity of 230,000 tonnes. In 1996, this was used for about 150,000 tonnes.

The subsystem of hazardous waste incineration in the Netherlands encompasses three advocacy coalitions. AVR-Chemicals belongs to the Incineration Procedural Coalition, together with its shareholder companies, the Ministry of VROM, the municipality of Rotterdam, and the provinces (IPO). One of the other coalitions is the Incineration Prevention Coalition, which consists of just about the same actors that oppose municipal waste incineration: the Netherlands Society for Nature and Environment (SNM); the Dutch Friends of the Earth (VMD); Greenpeace, and the Foundation Waste and Environment (A&M). The third coalition is called the Processing Development Coalition. It is formed by the Association of Chemical Waste processors (NVCA) and the private hazardous waste T&D companies it represents.

Incineration has become an ever more important part of the Dutch domestic hazardous waste processing. The technology improved and capacity grew. Besides, there has been a switch from a private to a public-private T&D organization. Compared to the 'dark' 1970s, also conditions regarding risks and regulation have changed for the better.

2.5 The Solitary Struggle of AVR-Chemicals

The Dutch hazardous waste T&D structure is diffuse and market-oriented. The collection, transport, and (pre-)treatment is largely in private hands. Besides AVR-Chemicals, also large industries incinerate hazardous waste, either their own or commercially for others. In 1991, AKZO and Shell together incinerated about 40,000 tonnes (Van der Naald 1991:14). Shell stopped incineration in 1992 (AVR-Chemie 1993:13).

AVR-Chemicals was officially founded in 1984. Before that time, hazardous waste incineration was one of the activities of AVR. All these years, it has been the largest and only public -and after 1984 public/private- hazardous waste incinerator in the Netherlands. This means that, although AVR-Chemicals is a member of the NVCA too, and has good contacts with sister companies abroad, when it comes to the quintessence of hazardous waste processing business, it is practically on its own. Both as a national monopolist, as well as a competitor on the European market, it has had and will have to fight for survival. To a large extent, this is the consequence of how AVR-Chemicals has chosen to operate, that is, as an end-processor. End-processing, however, has increasingly come under pressure. Because of this situation, this case can be denoted as the solitary struggle of AVR-Chemicals.

2.6 The Risk Issue: Internal Affairs

Environmental and Quality Standards

The Netherlands had a bad reputation concerning the way it dealt with the hazardous waste issue, especially during the 1970s. Several generators, transporters, or processors of hazardous waste were involved in illegal practices. On the other hand, the regulatory structure was imperfect, and governmental authorities were sometimes incompetent or even playing a part in these practices (cf. Van Vugt & Boet 1994). Three out of many examples may illustrate this. The first example concerns the Volgermeerpolder (just north of Amsterdam) which used to be a local landfill. In the 1960s, chemical waste was dumped there. Pollution was discovered in 1980, when barrels had leaked. The waste, including dioxin, had seriously contaminated the surrounding soil. The generators (Shell and Duphar) were charged with clean-up costs yet, after years of juridical struggle, acquitted by the court in Amsterdam in 1992. The judgment read that, at the time of dumping, the generators could not have known that there would be so much societal costs involved (140 million guilders) to remove the waste later (Glastra van Loon 1993:183-184). The second example is the enormous amount of hazardous waste that has been illegally dumped in Belgium, predominantly in Wallonia (Mellery, Mont-Saint-Guibert) during the 1980s (cf. Knoop 1991, Glastra van Loon 1993). Transporters like Kemp and Zegwaard have been accused for this, but the Dutch (and Belgium) authorities condoned it and even facilitated it. The third example is the most recent one. Between 1993 and 1996, an enormous fraud was disclosed at the processing company Tanker Cleaning Rotterdam (TCR). During previous years, TCR illegally discharged waste water containing oil and chemicals. The public prosecutor called it "the biggest environmental scandal ever", but also pointed at a "naive and failing government". Despite warnings, the Ministry of Public Transport and Water Works persisted in a supply of subsidies to TCR.

In most cases of irresponsible and risky handling of hazardous wastes, collectors/keepers, transporters, and so-called 'hazardous waste brokers' either took advantage of regulatory loopholes or deliberately offended orderly ways of treatment and disposal. AVR-Chemicals has not been bothered by major scandals like the ones mentioned. They have been pointed at shortcomings of their flue gas cleaning system (Knoop 1991:129-130) though, and at least two events did arouse the public. In 1989, AVR-Chemicals was accused of incinerating hazardous waste that contained concentrations of PCBs far above the permitted standards. This turned out to be false, because an engineering bureau who reported about AVR to the Environmental Inspection had made a calculation error. Micrograms were interpreted as milligrams. AVR was rehabilitated, but had experienced the impact of the bad reputation of Dutch waste processors. The other event occurred in 1992, when the stock of old batteries in the C-2 storage caught fire. This was probably caused by heating in a part of the 4000 tonnes of batteries. It did not bring about extra danger. Nor was it easy to blame AVR-Chemicals. Storing so many batteries was without precedent. It would have been better though, as was done since, to store them separately and improve monitoring. These batteries wait for new techniques to be ready to partly recycle them in large amounts.

Despite continuous offences against the environment, including risks posed to public health, there has been a gradual change from a 'wild west' situation to a more controlled structure including environmental and quality standards. Two parallel developments took place, one from no regulation, to direct regulation, to partial self-regulation; and one towards an increase of domestic processing. These changes have contributed to the risk management of hazardous waste.

Until the CWA became operative, it was not at all clear what should be regarded as hazardous waste. The Substances and Processes Decree made a start with that. Subsequently, an increasingly sophisticated framework of regulations has been built up, partly stimulated by European Directives. Also Incineration Guidelines were introduced. However, still in 1996 there are only formal environmental standards for the incineration of non-hazardous wastes. AVR-Chemicals is dealing with the RV '89, which became part of the Dutch Emission Guidelines (*Nederlandse Emissie Richtlijnen*, NER) since 1993, and serve as pseudo-legislation. Standards of these guidelines are part of the facility's permit. The

modern DTOs of AVR-Chemicals meet these standards. The permit for DTO-7 expires at the first of January 1998 (VROM & IPO 1996:111).

Both improved regulation and technological innovation have been applied to reach higher standards of control and processing. For example, part of the C-1 category waste that has been exported to Hessen, will now be processed in the Netherlands. Nevertheless, the Risk Issue in this policy subsystem is not relieved from problems yet. In general, hazardous waste has become more hazardous in two ways, that is, relatively because of stricter norms, and absolutely because of new production processes. Furthermore, a diffuse policy field like this remains susceptible to 'outlaws' thwarting the system.

From 1990, hazardous waste processors have jointly begun to improve their image by subjecting themselves to environmental and quality standards. In that year, the NVCA introduced their system of certificates for environmental and quality care. From 1993, it is compulsory for all NVCA members. The system reflects concern for taking responsibility. For example, companies with a certificate are obliged to take over the work of fellow companies in case of stagnation, personnel must have proper education, and a combination of certain functions (e.g. to make acquisition and to take delivery of waste) is prohibited. A certificate can only be obtained when the environmental and quality care standards are met. This is judged by independent experts. An important condition is that the environmental and quality care is organized systematically and as a part of the daily business routines. Companies have to qualify every year. Today, all members have a certificate. AVR-Chemicals got its first certificate in 1992. In the initial year of certification, it did not pass the test. In 1995, the certification system was elaborated in order to compensate, at least partially, for the permit system. The initiative to establish the Foundation for Certification of Integral Waste Disposal aimed for the harmonization of existing and developing environmental and quality care systems. It appeared that permit systems on the one hand and environmental and quality care systems on the other indicate a large overlap. The NVCA, therefore, endeavours to reach a situation in which their system is part of the permit regulation. The government maintains its position as controller and supervisor, but the waste processors charge themselves with self-regulation that covers a policy implementation in line with government objectives.

Economic and Environmental Interests

Why should there be disagreement on the risks of hazardous waste? If something is obvious, one would expect, it must be this issue. Yet, it isn't so. Each advocacy coalition appears to have its own combination of beliefs and interests, causing different policy positions on 'how bad it is'.

The Processing Development Coalition is the most optimistic one. Their look is directed towards the future, where they see ever more possibilities for recycling hazardous wastes. Mr. Nijdam, former secretary of the NVCA, indicated that when he started his work in 1988, his assignment was to change the image of the NVCA, which was strongly influenced by the common perception that waste processing is dirty and corrupt. He stressed that "although there is still a general view that waste is either being dumped or burnt, in fact the major part is being recycled". For the rest, this coalition dislikes "emotional-political discussions". It reminds Nijdam of the discussion about incineration at sea. The decision to stop this made no sense to the processors, because "it can be scientifically proven that incineration at sea is better than incineration on land. Hydrochloric acid is more harmful on land than at sea".

The leitmotif of the Incineration Procedural Coalition is to follow four principles: the principle of self-provision, that is to assure the availability of processing facilities in the state where wastes are generated; the proximity principle, which prescribes processing to be as close as possible to the place of generation, and therefore serves as a supplement to the principle of self-provision when processing possibilities are lacking; the ladder principle, or preference order for processing (prevention, recycling, incineration, landfill); and the ALARA principle for emissions and risks in general to be 'as low as reasonably achievable'. The principles reflect a risk management by rules and standards. Also AVR-Chemicals has to meet certain standards in order to keep their permit. This is perceived as rightful but rigid, yet acceptable when standards would apply universally.

> "AVR companies, and Dutch waste incinerators in general, have to comply to very stringent standards. I have just made a comparison between the emissions of a truck and a DTO. They appear to be very similar. If you take the European norm for trucking traffic and compare that with the RV '89, it shows that a DTO issues less than five heavy trucks driving at full speed. Theoretically, this means that when a truck delivers a tonne of waste to us, driving up and back at a speed of 180 km/h, it issues almost as much as the DTO that incinerates this tonne. That proves that our DTOs -but also the grate furnaces- are low issuers. AVR-Chemicals pleaded for European incineration guidelines that contain technological and environmental standards. The result will be less incentives to export hazardous wastes from the Netherlands, because foreign facilities will have to raise their tariffs in order to compensate their investments. Especially cement industries must be ordered to adapt more severe treatment and emission standards". (G. Peereboom, managing director at AVR-Chemicals, interview).

Risk management by rules and standards' is flexible, for it accommodates to changing contexts and definitions. This can be illustrated by two examples. First, AVR-Chemicals is allowed to discharge its effluent on the Nieuwe Waterweg, because the waste water is 'cleaner' than the river water. In fact, the Nieuwe Waterweg itself is rather dirty. AVR is situated downstream, so other industries already have discharged their effluent. Second, during the 1990s, the Ministry of VROM has switched its policy position on immobilization from aversion to acceptance. Immobilization of hazardous waste, provided that it is done 'safely', i.e. with the latest technology which produces strongly encapsulated materials, will enable recycling, and hence save C-2 landfill space and primary resources.

The Incineration Prevention Coalition takes a critical position on this issue. They approve strict standards for hazardous waste incinerators, but consider the NER and European Directives a worsening of the situation compared to the development that was initiated with the RV '89. They also oppose immobilization of hazardous waste. Immobilization can never assure to be risk-free. Some day the hazardous substances will be dispersed into the environment. Greenpeace even opposes recycling. They argue that recycling is never hundred percent possible. There will always be substances released or remain (vapours, gases, ashes), and several residues are often much more poisonous than the original hazardous waste. Besides, recycling allows waste exports, including shipments of hazardous wastes from OECD countries to non-OECD countries. Greenpeace International strongly opposes this kind of 'waste colonialism' (CRMH 1990:185, Smeitink 1995:10). Furthermore, immobilization and recycling distract the attention from prevention which, for this coalition, is the one and only long-term solution. As an immediate action, they advocate changes of production processes, especially in the chemical industry (cf. Van der Naald 1991, Greenpeace 1994).

> "One of many urgent issues is to decrease the production of chlorine. Wastes containing chlorine are extremely hazardous when burnt. Incineration is not a solution at all, and in many cases even making things worse. Meanwhile, the production of chlorine containing compounds goes on. AKZO-Botlek produces vinyl chloride for PVC. Among the wastes that are generated in this process, there are three times as much dioxins as the amount that is issued by all waste incinerators in the Netherlands. In earlier days, this waste was dumped in the sea, later burned at sea, and now burned on land, in an installation of AKZO which they call a 'recycling facility' because the remaining hydrochloric acid is rerouted to the production process. The whole situation is very risky. Yet, there are clear alternatives and substitutes". (W. van der Naald, policy executive at Greenpeace, interview).

The Risk Issue is definitely in a transition period. In spite of ineradicable forces of fraud in the field of hazardous waste T&D and slow progress in some areas of heavy industry, there are signs of change. Generators, processors, and policy-makers try to reduce the risks of hazardous wastes by means of regulation and innovation. Besides, the development towards a serious application of environmental and quality care systems, points to an internalization process among generators and processors to 'combine' environmental and economic interests. High quality processing becomes the new compromise. It legitimizes the generation of wastes, but endeavours to process these wastes by taking account of the environment. 'Internal affairs' once meant 'hidden practices'. This has been increasingly replaced by 'inclusive thinking'. Whether the interpretation of 'internal affairs' as national self-provision will hold out, is questionable. A new counterforce has come up in the form of regulated trade.

2.7 Policy Change

The hazardous waste management infrastructure in the Netherlands was not planned, let alone thought of as one coherent system. It has rather been the result of governmental intervention after the failure of private initiatives, of following technology development, and of reacting to capacity need and market changes.

In review, the policy developments concerning hazardous waste T&D in the Netherlands can be reconstructed into three stages. The first stage, mainly covering the 1970s, is characterized by a lack of regulatory structure and private T&D initiatives. The subsystem was trying to come to grips with the unclear, yet growing policy field of hazardous waste management. Central government gave way to a commercial arrangement of waste T&D. However, local governments were confronted with violations against the tender legislation. A situation emerged in which "central government paralysed local government initiatives" (in regulating UNISER and Booy Clean), and "local government paralysed a central initiative" (the Induval plan for storing hazardous waste). This reflected the fragmented structure of Dutch administration (Wynne 1987:100).

The second stage can be described by the developing regulation and definite governmental intervention during the 1980s. Two issues were prominent: "The relative unimportance of refined technical risk assessment as a regulatory resource", and "institutional uncertainty which created a need for a high degree of technical certainty" (ibid:110-111). Political pushing and pulling between central and local

governments, environmental organizations, business, and science actors, eventually resulted in the foundation of AVR-Chemicals, although this still needed the diplomacy of Minister Winsemius and his staff. Government gained control, but could only influence part of the subsystem.

The third and contemporary stage of the 1990s features a mature regulatory system, and a co-operative structure of government and business responsibilities. National regulation succeeded to cover an increasing amount of generated wastes. For a long time there have been several conceptual barriers between government and business. As the former NVCA secretary, Mr. Nijdam, put it: "Regulators often think that they are dealing with the mafia, whereas business often has the feeling that they are constantly being nagged by bureaucrats. It takes time for mutual trust and understanding to grow". It seems that the NVCA has played an important role in this process of understanding, for business is more and more getting used to the compliance with standards (of prescribed environmental and quality care systems), and government is gradually becoming convinced of the effect of changes in the waste sector that can be beneficial for both business and the environment. Different new developments are arising like, for example, 'industrial ecology': industries, often gathered on a large site, (re)use each others waste. These are supplementary steps in the 'greening' of industry.

AVR-Chemicals experienced several changes. It started with good prospects, but fell into a struggle for survival. Subsidies have ceased, prices dropped, and residues (slags, fly-ash) must now be treated. Whereas in earlier days the waste was brought, today it has to be 'fetched'. Competition has become more severe, and hazardous waste incineration is diminishing. Until now, AVR-Chemicals managed to stay in business, but the prospects are bad. When VROM was finally able to lower the export rate, it found that European self-provision outranks national self-provision. AVR-Chemicals relied on the policy of VROM and inadequately anticipated the new situation of an open market.

Since the beginning of the 1990s, the Ministry of VROM and the joint provinces have been actively planning the hazardous waste T&D infrastructure (VROM & IPO 1993, 1995, 1996). AVR-Chemicals depends on this policy, and as a result it had to accept that the management function (VROM & IPO 1993:66) it had gained was turned back again to its end-station function (VROM & IPO 1996:112). Two main reasons were the allowance of exports by the "changed position of the European Commission", and "a bigger accent on company-internal environmental care, deregulation, and control" (ibid:8). Here, the influence of the NVCA is obvious.

Changes concerning the waste incineration policy issues can be summarized as follows. Hazardous waste T&D and processing became ever more specific; the scale of specialist activities grew larger; international market forces grew stronger; and environmental standards started to be incorporated in business strategies, as well as to be combined with existing regulation. The recent development of environmental and quality care systems can be interpreted as a nice compromise between the advocacy coalitions involved in this field. The Incineration Prevention Coalition, although critical, will yet at least stress the "environmental" part of such systems; the Processing Development Coalition is anxious to improve the "quality" of its activities; and the Incineration Procedural Coalition favours the application of "care systems" in this policy context.

2.8 Conclusion

The *Risk Issue* has been dominated by the dioxin debate. Especially during the 1980s, dioxin emissions represented the utmost objection to waste incineration. Solid residues can be avoided, so people argued, but toxic particles swarming through the air were perceived as a terrifying threat. In the Netherlands this matter was approached technically by retrofitting waste incinerators with air pollution control systems. It also induced a lot of research, not only to improve air pollution control devices or incineration conditions, but also to know the emission rates and toxicological effects. In the Netherlands (and also elsewhere), this has led to two new basic insights, which in combination with improved technology, caused the dioxin debate to be hushed.

First, after it had been found out that dioxins are extremely hazardous and are being issued at waste incinerators, additional findings showed that dioxins are formed with practically all thermal processes (including the home fireplace, smoking, traffic) as well as in other industrial situations. Plainly speaking, there is no fire without dioxin. "In common terms, one could say there is a dioxin background level that correlates with civilization or industrial development. The more dense a population area, or the more industry, so the more dioxin". In addition, the share of waste incinerators in dioxin emission has dropped. Although, during the 1980s, waste incinerators were responsible for 80 percent of dioxin emission (Van

Broekhuizen et al. 1992:37), things have changed when most waste incinerators met the dioxin emission standard of 0.1 ng TEQ/m^3 of flue gas. When eventually all incinerators meet this standard, the issue will be technically 'solved' as far as emission into the air is concerned. Meanwhile, the blame has shifted from incinerators to 'the system'. Or as Prof. Hutzinger, ecological chemist and research director at the Bavarian Institute for Waste Research (BIfA), put it: "It would be more logical now to take measures against traffic or the heavy steel industry. Taking further measures against dioxins from waste incinerators would be as stupid as accusing me of polluting the environment with amalgam from my teeth plugs after spitting in the street".

Second, there is, as yet, no definite evidence that higher mortality rates at certain places are caused by dioxins (cf. Hulspas 1994). Accumulation of dioxins in human bodies appeared to proceed very slowly, which caused the risk perception of many people to become milder.

In general, however, it remains disputable to justify the production of dioxins, for what happened is that environmental risks have been shifted from the air to the soil. Flue gas cleaning residues have to be landfilled. In addition, slags (containing heavy metals) are allowed to be applied in construction works when processed or immobilized. This could become the new future environmental risk issue. Mr. Klingenberg of the Dutch Environmental Inspectorate and former policy executive at the Netherlands Society for Nature and Environment (SNM), warns: "People acknowledge that air emissions are risky, but ignore that lixiviation is harmful too. It is very likely that in the future, a discussion will arise on soil and water pollution as a result of waste incineration. However, this is a sneaky problem, hard to prove and with a long-term feedback".

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4. Health Conditions around Belgian Incinerators Recall Seveso Disaster [1]

Wim de Mol, MSc

Waste incineration installations pose a serious public health problem in many countries because of dioxin, furan and PCB discharges. Various health complaints, which develop among residents of surrounding areas over some 10 to 20 years, are caused by these substances in a pattern recognizable at incinerator sites throughout the world. The Sint-Niklaas (Belgium) Incinerator Working Group compared complaint patterns around the incinerator there with complaint patterns around Seveso, Italy, and found striking similarities. The link between dioxins and cancer has long been suggested by the large number of complaints from people living near waste incinerator installations and is confirmed by a recent study involving more than 1,000 ex- employees of the Philips Duphar herbicide factory in Amsterdam.

Waste incinerator at Sint-Niklaas exceeds standards

Dioxins attach themselves to dust particles, which spread through the air in the vicinity of a waste incinerator and then settle on the ground (deposition). Thence, via the milk and meat of cows eating the contaminated grass, they find their way into the human body, where they accumulate in fatty tissue (accumulation). Exposure of persons living near an incinerator takes place mainly through inhalation and to a lesser extent through ingestion. The incinerator in Sint-Niklaas is the only source of emissions in the vicinity. From 1977 to 1988 the incinerator operated without any filtering devices, so that during those ten years unlimited emission took place. In the years following 1988 the discharge of dioxin-like substances, heavy metals and toxic vapors diminished thanks to the installation of filters. For dioxins, the emission standard of 0.1 ng per cubic meter of air (*) is still not being met.
According to VITO (*) model calculations, the dioxin content of cow's milk in the most polluted sector amounts to 7.9 pg TEQ per gram of milkfat. No standards exist in Belgium for the amount of substances that settle on the ground (deposition).

Complaint reports and health research

In November 1997 the Sint-Niklaas Incinerator Working Group requested the population of Sint-Niklaas to report any pathological symptoms that might resemble the dioxin syndrome. One hundred and fifty reports were received, most of them originating at a distance of at least two kilometers in the prevailing wind direction. The complaints consisted predominantly of cancer and serious cardiovascular ailments. Mispel Street in Sint-Niklaas was chosen for a health study, as it had produced the most reports. Ground measurements here yielded the highest dioxin concentrations registered in any of the vicinity's residential areas. Questionnaires were distributed to 145 households in Mispel Street, and 281 persons responded. Ninety-eight of these (35%) reported complaints, including a noteworthy number of boys.

Cancer cases rise

Seventy-one percent of all deaths in Mispel Street were attributable to cancer. This is 21% more than the statistical average of 50% in Flanders. The incidence of cancer (*) was shown to have risen steadily from slightly more than the average in Flanders in 1986 to 4.8 times the average in 1995-1997. The increase was found to be approximately the same for all categories of cancer. It was noteworthy that none of the women had died of cancer of the breast or cervix. Statistically these cancers cause 21% of the deaths of women in Flanders. This paradoxical phenomenon was also found at Seveso.

[1] From: Dutch Monitoring Network on Health and Environment NEWSLETTER, December 1998. Homepage: http://www.ecomarkt.nl/sgm

Similarities to Seveso

The report points to a marked correspondence with the pathological profile recorded at Seveso, Italy, where in 1976 thousands of residents were exposed to high concentrations of dioxins following an explosion in a pesticide plant. Blood samples of exposed individuals taken 20 years after the disaster showed a dioxin content two to three times higher than normal. A rise in mortality from intestinal, lung and liver cancer, a sixfold increase in leukemia and Hodgkin's disease, and a twofold increase in sarcoma have been observed at Seveso since 1976. Lower mortality figures were recorded for breast, cervical and ovarian cancer. This drop is attributed to dioxin's (TCDD) strong anti-estrogen effect.

Pathological profile around incinerators

According to the working group, a generally predictable pathological profile tends to emerge from the data involving several incinerators: From the time an incinerator starts to operate, surrounding residents develop respiratory, skin and allergy problems. After five years of operation, the first cancers appear in persons up to 28 years of age: leukemia, Hodgkin's disease and non-Hodgkin's lymphoma (especially at short distances up to 1.5 km). Low-birthweight and congenitally deformed children are born. Threatening prematurity occurs and the death rate among children rises.
Up till 10 years of operation, no clear increase in cancer is found except among younger individuals. But after 13 years the cancer rate is twice as high as elsewhere, and this factor increases to 4.8 after 20 years. Endometriosis and other conditions of the uterus and cervix appear after 10 years. The cancers occur predominantly downwind from the incinerator and in its immediate vicinity. The incidence of cancer diminishes as the distance from the incinerator increases. Many people in the immediate vicinity of the incinerator complain of chronic fatigue, insomnia, hyperventilation, respiratory problems, stress, gastric disorders, allergies and hormonal problems. Also reported are rises in suicide, criminality and feminisation (*).

Recently determined link between cancer and dioxin in humans

An explosion at a Dutch Philips Duphar herbicide plant (*) in 1963 exposed hundreds of people to high concentrations of dioxins, furans and PCBs. A recent study of former plant employees found them to have a seven-and-a-half times greater than normal chance of developing cancer. This is about the same as the risk incurred by smoking cigarettes. The study, conducted by RIVM (*) at Bilthoven and LUW (*) at Wageningen, was published in the summer of 1998 in the American Journal of Epidemiology. For the first time a strong link was demonstrated between dioxins and human death from cancer and cardiovascular disease. Blood analyses indicated that the employees performing the most hazardous tasks also had the highest dioxin content in their blood. By including these data in a statistical model epidemiologists can now predict the probability of cancer resulting from a given exposure to dioxins. Environmental standards have heretofore, for lack of studies on human subjects, been based exclusively on animal studies. The researchers now want to move on to extrapolating the high dioxin concentration curves to the lower contents currently present in the environment. This could highlight the link between the observed cancer mortality around waste incinerators and long-term exposure to low dioxin concentrations in the environment. High concentrations like those at Seveso and the Philips Duphar plant will probably not occur again. Long-term exposure to low concentrations in the environment (including food) can ultimately lead to high concentrations in the blood, because dioxins can neither leave the body (they are strongly lipophilic), nor be broken down.

(*) Terminology

ng - nanogram: one thousand millionth of a gram
pg - picogram: one billionth of a gram
TEQ - toxicity equivalent, a measure of the toxicity of the various dioxins,
PCBs and furans, whereby these can be considered under one rubric.
Feminization - faulty development of the male reproductive system in male organisms,
VITO - Flemish Institute for Technological Research
Incidence - the quantity of new cases of disease per year and per 100,000 inhabitants
Herbicide - a substance designed to combat weeds
RIVM - National Institute for Public Health and Environmental Health
LUW - Wageningen Agricultural University

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Newsletters October 1997, November 1997, April 1998.
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Dutch Monitoring Network on Health and Environment.

5. Social and Policy Implications of Low-Level Exposures to Chemicals[1]

Nicholas A. Ashford and Claudia S. Miller

The Problem

There is mounting evidence that human exposure to chemicals at levels once thought to be safe (or presenting insignificant risk) could be harmful. So-called low-level exposures have been linked with adverse biological effects including endocrine disruption *(1)*, chemical sensitivity *(2)*, and cancer *(3)*.

In the 16th century, Paracelsus observed that *the dose makes the poison*. A more apt and modern revision might be that *the host plus the dose makes the poison*. Prior susceptibility of the host, whether inborn or environmentally induced, followed by other lifetime exposures, can cause irreversible injury. Humans in their most vulnerable developmental state, whether in the womb or during infancy, warrant special consideration, both in their own right and as sentinel indicators.

The emerging science associated with low-level chemical exposures requires that we change both (1) the way we think about chemicals and health, including the adequacy of quantitative risk assessment, and (2) the solutions we devise to prevent and address chemically-caused injury.

Box 1

STAGES OF A PARADIGM SHIFT

(After Kuhn)

1. **Ignore departures from the existing paradigm**
2. **Deny that an anomaly exists; blame it on faulty observation or testing error; deride the proponents of the new paradigm**
3. **Acknowledge the anomaly, but call it "idiopathic"**
4. **Try to explain the anomaly with the existing paradigm, sometimes by making minor adjustments.**
5. **Seek alternative paradigms to contradict or minimize the one proposed.**
6. **Recognize paradigm as valid, but within a narrow context relegated to "exceptions"**
7. **Accept the new paradigm as offering some explanatory power, but retain the old paradigm, too**
8. **Discredit the old paradigm; deride any attempt to reinstate or rehabilitate old paradigm**
9. **Accept new paradigm with enthusiasm**
10. **Begin again**

Source: Ashford & Miller Chemical Exposures: Low Levels and High Stakes, John Wiley Press, 1998.

Chemicals and Health

In his seminal work, The Structure of Scientific Revolutions, Thomas Kuhn described the process by which scientific knowledge evolves *(4)*. I have adapted his general theory to address specifically the issue of emerging theories of disease (Box 1).

New theories emerge only after much difficulty. At this point in time, we are just beginning to recognize the link between chemicals and a host of new public health problems that challenge the tenets of

[1] Presented on 11 August 1998 at the First International Conference on Children's Health and Environment, Amsterdam, the Netherlands, 11-13 August 1998

traditional toxicology and medicine. These include birth defects (and other damage) due to developmental toxicants; auto-immune diseases, including lupus, scleroderma, and Sjøgren's Syndrome; certain chronic conditions in children such as attention deficit hyperactivity disorder, depression, and asthma that have become more prevalent in the past few decades; chemical sensitivity including its overlaps with sick building syndrome, the unexplained illnesses of Gulf War veterans, chronic fatigue syndrome, fibromyalgia, and toxic encephalopathy and, finally, new links to cancer, including childhood cancers.

These emerging public health problems are characterized by six common threads, which provide us with *a new perspective on disease*:

(1) The *nature of disease* represents a departure from many classic diseases such as tuberculosis and heart disease in that *communication systems or networks*, rather than specific organs of the body appear to be targeted by chemicals. These include the *endocrine* system, the *immune* system, and the *neurological* system;

(2) *Cause of Illness. No single cause* has been identified for each of these conditions. Further, there are often *no clear biomarkers* for either exposure or disease. Consequently, classical epidemiology is less able to identify susceptible or sensitive subgroups;

(3) *Multi-stage Disease Processes.* Disease becomes manifest after two or more *stages* or events occur. For example, some cancer (and of course cancer is not a single disease) may proceed first by *initiation*—a mutation that alters the genetic material of the cell—followed by the *promotion* of cancer cells to a recognizable tumor. These two stages can involve different chemicals, radiation, or viruses. It has been hypothesized that Toxicant-induced Loss of Tolerance (TILT)--a new theory of disease—leading to chemical sensitivity also proceeds via a two-stage process: (a) an initial exposure to high levels of certain chemicals (or repeated exposures at lower levels), followed by (b) triggering of symptoms by everyday chemical exposures at levels that do not appear to affect most people *(2)*;

(4) *Time and Timing*. The *time* between the first and subsequent stages of disease can be long enough to obscure the connection between exposures and ultimate disease. The latency of chemically-caused cancer is measured in years. Observable reproductive system failure after endocrine disruption can occur years later. Furthermore, the *timing* of the initial exposure can be crucial because there are crucial periods in the developmental process that are especially susceptible to damage. Chemical sensitivity—resulting from Toxicant-induced Loss of Tolerance—reportedly can develop months after the initial exposure and remain manifest for years. The timing of the initiating doses appears important. Loss of tolerance does not always require a high initial dose; smaller doses, strategically timed, might also cause pathological loss of tolerance;

(5) *Departure from Classical Explanations*. The classical approaches and models used in both toxicology and epidemiology, premised on single agents disrupting individual organs, do not explain these diseases. Moreover, the relationship between the initiating exposure and ultimate health effects/disease (the dose-effect/response curve) is not monotonic—i.e., the extent of disease does not increase in a regular way as a function of dose. We have seen this vividly in the recent work of Fred vom Saal on the endocrine-disrupting effects of bis-phenol A *(5).*

Endocrine disruption (ED), TILT, and some cancers appear to represent a failure in functional and/or adaptive processes in important systems or networks as a result of chemical exposures at concentrations three to six orders of magnitude lower than those associated with classical toxic effects in normal individuals. Moreover, individuals exposed below "safe" thresholds to multiple xenobiotics simultaneously, as in a sick

building in which hundreds of volatile organic compounds might be present in the air, may be affected.

and

(6) *Underlying Disease Processes.* Endocrine disruption (ED), TILT, and some cancers may be inter-related. ED disrupts normal development, and possibly the immune system, resulting in increased susceptibility to certain cancers. ED might also affect the neurological system, leading to increased susceptibility to sensitization by chemicals. TILT manifests as a loss of tolerance to everyday chemical, food, and drug exposures in affected persons, possibly leaving these individuals more susceptible to other disease.

[TILT may, in fact, represent a new theory of disease *(2)*] Just as the general category of "infectious diseases" encompasses a diverse spectrum of diseases involving different organisms (which affect different organs via different *specific* disease mechanisms), TILT may arise from different chemical exposures (which, like the infectious diseases, could affect different organ systems via different *specific* disease mechanisms). With Toxicant-Induced Loss of Tolerance, key systems of the body appear to lose their ability to adapt to low-level chemical exposures. Finally, cancer proceeds when adaptive, homeostatic repair processes and the immune system no longer function as they should, although the cause of the loss of protective function is not well understood.

Public Policy Responses

I propose that a systems-focused approach to disease best fits the pattern of these emerging illnesses of the 21st Century. It is likewise my view that a systems approach likewise is needed as we fashion our public policy responses. The lack of clear biomarkers and the time lag between initiating exposures and ultimate disease make it technically, and therefore increasingly politically, difficult to develop the extensive body of evidence needed to *regulate* many chemicals and industrial processes or to *compensate* the chemically injured. For this reason, we must seriously consider adoption of the *Precautionary Principle*, a concept endorsed at the UN Conference on Environment and Sustainable Development in Rio de Janeiro and already implemented in some European and U.S. regulatory systems. That is, we must act preventively in the face of uncertainty, erring on the side of caution. This requires education of the public, government, and industry, as well as political courage and conviction.

Over the past 25 years, scientific concern over emerging environmental or public health problems generally has begun with a suggestion—sometimes a mere whisper—that trouble was brewing. Those suggestions and whispers ultimately ripened into full-fledged confirmations that our worst fears were true. Examples include asbestos-related cancer, and the toxic effects of benzene, lead, and persistent pesticides. The frightening but enlightening reality is that with few exceptions the early warnings warranted heeding and the bulk of predictions were certainly in the right direction, if not understated. In retrospect, not only were our precautionary actions justified, but we waited far too long to take those actions. Endocrine disrupting chemicals present an opportunity to act more quickly than we have in the past, although some damage has already been done. Intervening now to prevent the next generation of developmentally or immunologically compromised or chemically intolerant persons, many of them children, is both possible and necessary.

Admittedly, there is considerable uncertainty about some aspects of endocrine disruption and other systemic damage or injury. We are told that this uncertainty places environmental legislators and regulators on the horns of a dilemma. They must risk making one of two types of mistakes: a Type I error is committed if they fail to regulate a chemical which turns out later to be harmful; a Type II error is committed if they regulate a chemical, imposing large costs on industry and the consumer, and the chemical later turns out to be safe. The Precautionary Principle argues for regulation when the scientific evidence is sufficiently compelling*--but not perfect. It states a preference for avoiding a Type I error. As long as there is some scientific uncertainty, even if it is small, a potentially regulated industry is understandably more interested in avoiding a Type II error.

It is clear that a harmonization of policies amongst the relevant stakeholders is needed. For the major stakeholders, these public policy responses suggest specific challenges:

For industry it means a new kind of corporate stewardship that is in harmony with their customers' and the public's expectations that they will adhere to the Precautionary Principle, including the continuous seeking of less toxic, more sustainable technology to replace the old.

For government it means a return to its role as a *trustee* of the environment, public health, and sustainability—rather than serving as an *arbiter* or *mediator* of conflicts among the stakeholders. Further, government needs to address both its support of research and its interventions to all the stages of multi-stage disease, for example to promoters as well as initiators of cancer—and to initiators as well as triggering of chemical sensitivity.

For the media it means an increased commitment to understanding, reporting, and educating the public about the truth—the *complex* truth—which takes more than a sixty-second sound-bite or a 3-inch column.

For the public interest/non-governmental organizations it means coalition-building and agendas that involve disparate groups, such as parents concerned with birth defects, advocates for toxic-free schools, and unions concerned with occupational exposures.

For the international community it means a commitment to research and to multilateral environmental agreements, such as the proposal to ban Persistent Organic Pollutants (POPs). It will be important to ensure that such future agreements do not result in banning endocrine disrupting chemicals only to substitute chemicals with some other kind of harmful effect, or putting workers at significant risk in order to protect the general public. To win international approval, the strategy for EDs and other harmful chemicals must be one that ensures that less-developed nations have access to superior technology so that they can "leap-frog" into sustainable development. This is yet another reason to ensure that policies for science, technology, and regulation are coordinated.

Finally, **for private philanthropy** it means greatly increased support for independent science, advocacy efforts for the environment, and education of the public.

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6. Environmental Influences on the Health of Children[1]

by Rosalie Bertell, PhD, GNSH

Epidemiology arose primarily out of the study of work place hazards. However, as these hazards more and more encroach on the living space, we are being pressed to assess directly the effects of workplace hazards on children, and even on the embryo and fetus. Moreover, the mixture of hazards is often highly specific to the place being studied, and general research, for example, on exposure to one specific chemical through a water pathway, can no longer be undertaken. This means that the classical epidemiological study fails to be relevant on two scores: first, it usually deals with only one hazard at a time, and secondly, it requires large populations, which are seldom available in a residential exposure situation. Studying a mobile residential population living near to a toxic waste dump is very different from studying workers who are of a similar age and health status, who spend some forty hours a week in a very specific industrial environment. Workplace exposures allow for an eight hour day exposed, followed by a sixteen hour recovery period away from the exposure. There is no such respite period for a child living in a contaminated environment.

Because of the specificity of the mixture of hazards in any one residential area, together with the specificity of the ethnic backgrounds and occupations of the residents, findings in any studies, which are undertaken, will of necessity be highly site specific. This means that results are not easily transferred to experiences of other communities, since these new communities will have inevitable differences both in the mixture of hazards and the vulnerability of hosts.

Because of these new complications, it is my opinion that we are on the verge of developing a new medical discipline, which I will tentatively call Community Health Care, and which I see as an expansion of Public Health. It will be important to collect careful Case Studies of Community Diagnosis, Interventions and Outcomes so that commonalities and differences can be analyzed, helpful medical interventions need to be assessed and basic theories developed. These Case Studies will provide the input for Preventive Health Action on the community level. My model assumes a community level parallel to the doctor-patient relationship. The Community Health Care professional will translate the findings of epidemiology into beneficial interventions on the community level to improve the health of the community. These interventions are site specific, and it will take time to develop general principles of care.

Several such Community Health Case Studies are briefly presented here. In no case is there a complete case history including the intervention and outcome results. However, I think that you will be able to follow the deliberate change in attitude which I am proposing, namely, that we no longer consider a community in crisis because of pollution only as an opportunity for studying the health consequences of the exposure and adding to universal epidemiological knowledge. Rather, I am considering the community as "patient" in need of the epidemiological information gained elsewhere for understanding whether or not its health has been compromised, and whether or not there are remedies which will restore quality of life. Obviously at times both approaches will be legitimate. However, today I will stress the second approach, which has been neglected for too long. Remember that because this is a new approach, I too am learning!

First Case Study: McClure Crescent

McClure Crescent is a housing development, which was built on a farm used by the Radium Luminous Industries (RLI), which operated in Toronto in the 1940's painting radium on dials to make them glow in the dark. They painted the cockpit dials for the bombers in World War II. After the war, RLI was shut down, and the area was used as a disposal site for the radium source, its decay products and contaminated work place materials. The contamination was first identified in 1945 by the Canadian Foreign Exchange Control Board, which had been investigating the RLI for the National Research Council. There was incomplete follow up of the concerns.

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The Province of Ontario was warned again about the potentially serious contamination in 1975, and then again in I980, when two Ryerson University Journalism students, tipped off by former RLI workers, brought the problem to public attention. The Housing Subdivision, McClure Crescent, was built by the Ontario Housing Corp., which had not been told about the contamination. Homes on the contaminated land were sold under a Home Ownership Made Easy Lottery in 1973. There were 270 homes allocated through the lottery, most were won by young couples just starting their families.
After the 1980 public disclosure, MacLaren Engineers tested the area for the Atomic Energy Control Board (AECB), the Federal Regulatory Agency in Canada. It found one place, behind the homes at 110 and 112 McClure, with gamma radiation levels fifty times normal soil levels (50 mSv), and many homes with levels two to three times normal (2 to 3 mSv per year). The AECB agreed to remove 4000 tons of contaminated backyard soil from the area. At the same time, it declared that there was no threat to the health of anyone in the neighborhood. At the time the AECB maximum permissible radiation exposure level was five times normal terrestrial background (five mSv per year). In 1990 this recommended maximum permissible level was reduced to about one times background (one mSv per year). That means that in 1980, except for the buried radium source, the pollution was "legal", and after 1990, although it was still technically legal, the Government had declared its intention to implement the new lower standards, which would make the contamination "illegal".
EDA Engineering was brought in by individual families to determine the extent of contamination on their property, and they confirmed the MacLaren findings. The Nuclear chemistry laboratory at the University of Waterloo confirmed that the radium in soil was about one tenth the concentration found in uranium mine tailings piles, which are considered to be quite dangerous. However, unlike uranium mine tailings, this radioactive debris was in the backyard of homes containing young children.

Community diagnosis
At the request of parents who were worried about possible health effects for their children, IICPH undertook urine analysis for polonium 210, a decay product of radium, and blood counts with differential. Blood changes are known to occur at low level radiation exposure. Uranium or radium which is not excreted from the body, becomes incorporated in bone. Its decay product, radon gas, is able to escape the bone and both radon and its decay products can be excreted in urine. Through chemical and radiochemical techniques, it is possible to test for a decay product of the radon gas, polonium 210, as an indicator of the incorporation of uranium or radium in bone. Each participant also completed a short questionnaire, noting the length of residency, age, sex, ethnicity and relevant socioeconomic information.

Urine analysis
In the first test, urine samples were collected from about 12 children, and the samples combined. The AECB had refused to have the urine measured at the government laboratory, so we requested measurement at the University of Waterloo laboratory. Dr. Sharma, who did the chemical analysis, combined the samples. He did not expect to find anything, and was surprised to find high gross alpha and beta radiation counts. Because of this positive finding we again collected 24-hour urine samples for three exposed children, a control adult and a control child. The children were designated low or high exposed based on the engineering analysis of their family home property. However, it is acknowledged that children are quite mobile in a neighborhood. The measurements were as follows:

Control Adult:	**0.1 (+ or - 0.12) pCi per 24 hours**
Control Child:	0.0 (+ or - 0.12) pCi per 24 hours
First Low Exposed Child:	0.17 (+ or - 0.12) pCi per 24 hours
Second Low Exposed Child:	0.40 (+ or - 0.13) pCi per 24 hours
High Exposed Child:	2.30 (+ or - 0.15) pCi per 24 hours

Uranium workers' levels of Lead 210 in urine is reported in the literature as between 0.47 and 5.0 pCi per sample, with an average of 1.16 pCi per sample. The expected value of lead 210 in urine for an adult non-smoker is 0.05 pCi per sample. In a study undertaken in Elliot Lake for adults, including smokers and non-smokers, researchers found an average of 0.2 pCi per sample of Lead 210. The McClure Crescent children had levels of Lead 210 in urine which indicated above normal, even comparable to a uranium miner's, exposure to the decay product of radium.

Blood count
Fifty-eight children, between ages 5 and 15 years, gave blood samples to the MDS laboratory for Complete Blood Counts and Differentials. The Laboratory handled the blood in the same way for each child's count. Each child had three tests, done one week apart and the findings in absolute count were averaged for the study. Children with a sore throat, fever or possible cold/flu at the time of testing or within two weeks prior to the testing were eliminated from the study by the MDS professional who took

the blood. Exposure level for the child was estimated on the basis of the engineering findings on the child's home property. Children were divided into two categories, except for the preliminary study of trend with dose, in which case three categories were used.
In the preliminary examination of the data we separated the exposed group into three categories: those with buried radioactivity on their home property (HIGHER EXPOSURE), those with only surface contamination as determined by the engineering study (MEDIUM EXPOSURE), and those with no contamination on home property, designated LOW EXPOSURE. The average white blood counts for children in the three exposure categories in the preliminary test were:

Exposure level	White blood counts
Normal:	4,300 to 10,800 per microlitre of blood
Low Exposure:	7,552 per microlitre of blood
Medium Exposure:	6,409 per microlitre of blood
High Exposure:	6,323 per microlitre of blood

An F-test showed that the linear trend with dose was significant (probability of 0.02). The differences were most dramatic for the monocyte, a type of white cell produced by stem cells located in bone marrow. The Lead 210 is stored by the body in bone, and the monocyte stem cells are know to be highly radio-sensitive. The trend with dose for monocyte count was statistically significant by an F- test on the 1 % level (probability 0.006).

Average monocyte count per microlitre of blood:	
Low Exposure	386
Medium Exposure	346
Higher Exposure	271

These findings were unaffected when controlled for race, age or ethnicity. Socioeconomic status in the neighborhood was uniform. Some children had clinically low monocyte counts, below 200 per microlitre of blood. Four children had to be referred to medical follow up. There were 24 children on the uncontaminated property (caller lower exposure) and 34 living on contaminated property (the combined medium and high exposure groups). Our findings of the differences in monocyte counts for unexposed vs the exposed children were as follows:

Category Measured	Contaminated Property	Uncontaminated Property
Number of Children	34	24
Number with at least one low monocyte count	26(76.5%)	10(41.7%)
Number with at least two low monocyte counts	(32.4%)	2(8.3%)
Number with three low monocyte counts	2(5.9%)	None
A zero monocyte count	8(23.5%)	None
Total number of observations	101	64

The monocytes have two important functions, they release a chemical, which activates the cellular immune system, the lymphocytes, and they recycle about 37% of the iron from dead red blood cells into new red blood cells. Their depletion can result in iron deficient anemia and/or immune depression.

Intervention

At the time we envisaged "intervention" to mean clean up of the property and formation of a register for follow up of the children. The local and Provincial government strongly resisted both efforts. However, the federal government did make attempts to find a "temporary waste dump" for the contaminated soil. Each location announcement precipitated citizen organizing and protest. It was more than ten years before the contaminated soil was moved onto an industrial site. Meanwhile the government re-purchased the homes and turned them into rental property for low income families. No further human health assessments were made.

Outcomes

One of the children with significantly low monocyte count in the blood study and a moderately high level of Lead 210 in urine, died at age 16 years, three years after this investigation. His family's property was contaminated, and removal of soil was advised but had not yet occurred. Another child, the one living closest to the "hot spot" area, who also had significantly low monocyte counts, later as a young married woman had two miscarriages. A third pregnancy resulted in a very difficult Cesarian birth which was followed by several weeks in intensive care for a severe infection. The doctors found this strange for a young seemingly health woman. We did not have specific information on Lead 210 in urine for this individual.

Canonsburg Radiation Exposure

Canonsburg, Pennsylvania, site of a closed radium factory with its radioactive waste was the Number

One Site under the US Super Fund Clean-ups. The factory radioactive tailings pond had been capped, and because no weeds grew on this site it became the local baseball diamond.
Because of the similarity in exposure to that of McClure Crescent, urine analysis of the children exposed to this site was immediately undertaken. Twenty-four hour urine samples were obtained from 45 children between the ages of 3 and 18. Each family filled out a questionnaire on distances, back yard gardens, passive smoking in the household, and other relevant information. This was one of the first attempts to systematize the information gathered on children. After subtracting background levels of Lead 210 in the urine samples, the children's urine measurements ranged from 0.002 pCi to 0.770 pCi per 24 hour sample. Fourteen (38.9%) had levels above 0.2 pCi per 24 hour sample. The expected level of lead 210 in adult non-smokers is 0.05 pCi per 24 hour sample. All of the children with more than 0.20 pCi per sample live within 2. 5 miles of the dump site and/or attend school within 2.5 miles of the dump site.
Correlation between Environmental Information and Uranium in Urine

Characteristic	Number of Children	Average Lead 210 Level
Home within 2.5 miles of dump.	20	0.247 pCi/sample
Home more than 2.5 miles from dump.	16	0.188 pCi/sample
Resident more than 5 yrs.	14	0.320 pCi/sample
Resident less than 5 yrs.	6	0.078 pCi/sample
Under age 7 yeears.	9	0.107 pCi/sample
Age 7 or above.	27	0.259 pCi/sample
Eats backyard vegetables.	16	0.208 pCi/sample
Does not eat backyard vegetables.	17	0.183 pCi/sample
Eats backyard vegetables and home <1.5 mi. from dump.	9	0.307 pCi/sample
Eats backyard vegetables and home >1.5 miles from dump.	7	0.087 pCi/sample
All non-smokers in home.	20	0.162 pCi/sample
Smoker(s) in home.	4	0.140 pCi/sample
Missing answer.	10	0.371 pCi/sample

There was no follow up to this study. In fact the US government opposed the testing of the children and went so far as to cancel urine testing for the site clean up workers, close the urine analysis laboratory at Argonne National Laboratory (which was doing all of the urine analysis for uranium workers in the US) and fire the researcher who had been doing the analyses. This action was taken subsequent to the researcher's agreement to test the children. This researcher taught Dr. Hari Sharma, a nuclear chemist at the University of Waterloo, Canada, to do the Lead 210 testing, so that all of our analyses use his methodology. The findings are therefore comparable with published data on uranium workers in the US.
There was an unusually high number of childhood cancers reported for the Canonsburg community prior to the clean up, but no thorough study of this was done. The dump had been in the neighborhood since about 1910. Dr. Radford, then at the University of Pittsburgh, included the community in a thyroid abnormality and cancer study he was supervising for student researchers at the time. The Canonsburg population showed a higher than expected level of thyroid abnormalities and cancers. (Evelyn O. Talbott et al, "Problems in Determining Health Effects of a Community Exposed to Toxic Waste", Department of Epidemiology, Graduate School of Public Health, University of Pittsburgh.) However, no distinction was made in this study between those born in the area, and therefore potentially exposed in utero, and those born elsewhere. No mechanism for this effect was given.

Brock West Municipal Waste Landfill

This municipal landfill was given a Certificate of Approval in April 1973, and is located in a rural area of Pickering, outside of Toronto. The area was later developed, and the landfill site is now within 500 metres of homes. According to the original plans the landfill would be open for five years. However, it was used for more than twenty years and in 1988 was reported to be seriously leaking. Plumes were identified moving through Metro Toronto Conservation Authority lands to the Duffins Creek. Area children were known to play near or even in the Creek.
A random sample of residents was chosen to fill out a questionnaire which included socio-economic information on the family, life-style and hobby questions, detailed information on potential household pollutants, school information, outdoor habits and local area potential hazards. There was included a sub-study, with one child per household, chosen in a systematic way so as to neither over-represent those with medical problems nor overemphasize households which might have indoor pollution problems. Detailed medical and life style information on this representative child was collected.
A trend toward more asthma and more eczema was found with three surrogate levels of exposure to the landfill leachate:1. Plays in or near the Duffin Creek; 2. Does not play near Duffin Creek, but Mother

reports odors from the landfill detected in the home; 3. Neither of these two reported. All questionnaires were filled out by the mother in the randomly chosen household.
The risk of asthma in children who play in or near the Duffin Creek is twice the asthma risk for children who do not play in or near the Duffin creek. This finding was statistically significant on the 5% level. The risk of eczema of these children was also doubled, and was statistically significant on the 5% level. The intermediate level of exposure had an intermediate rate of asthma and eczema.
This research was also resisted by governments. Because of this resistance, the methodology which had consisted of participatory research using local health professionals and volunteers, was scrutinized by the local University Environmental Health Department. They found a potential bias in collection, since the citizens had tired of keeping records on responses. However, internal checks on the data showed that the data was most likely randomly collected since the randomly designated children had a normal sex ratio. There had been no mandate to assure this outcome.
Although the government did not "accept" the study, they acted to close the landfill.

Other Research:

The International Institute of Concern for Public Health has undertaken other research on the environmental influence on the health of children and can be found in publications referenced below. The Wisconsin study of the death rate of low birth rate babies seems to indicate that separating infant mortality rate by birth weight category in routine vital statistics reporting would (unfortunately) be helpful in assessing air pollution. Since a baby's death certificate does not ordinarily contain the birth weight, this would require a simple change of forms.
The research which the Institute undertook in the Marshall Islands, where residents tried to inhabit Islands which had heavy nuclear fallout after the atmospheric tests at Bikini, showed the same monocyte abnormalities noted at McClure Crescent and Canonsburg. These residents where not in the initial fallout, and they did not live on the contaminated Island until after the US Government had declared them "safe".
A major study of uranium contamination on the Mississauga Reserve in Northern Ontario is unpublished at the request of the Native Band involved in the study. However, requests for copies the study can be made to the Chief, if the findings will assist other communities struggling with uranium pollution. The Mississauga Reserve is across the highway and down wind to a uranium processing plant. In this investigation a grid over the reserve was used to determine the pattern of deposition of the uranium dust, and isopleths made to guide the People in locating their homes and vegetable gardens and in choices of areas for picking herbal medicines and sweet grass for their ceremonies.
Studies of the Mississauga Reserve residents for monocyte depletion and uranium in urine were undertaken and indicated residential contamination which was internal and affecting especially the children. In this case the Band used several interventions including:

- Moving the children's daycare centre away from a contaminated area.
- Substituting distilled water for drinking and cooking purposes in homes for all children.

Within three months on the distilled water the monocytopenia on the Reserve disappeared.The children's counts had averaged 270 per microlitre blood, and they were raised to an averaged 690 per microlitre of blood. This was more than a substitution for local water, since the main pathways for internal contamination on the Reserve was via air and local produce, not water. Distilled water is known to leach inorganic heavy metals from organic material. This increase is also too large an increase to be attributed solely to a placebo effect.
In another project which the Institute undertook in Bukit Merah, Malaysia, a community exposed to the Asian Rare Earth Co., a subsidiary of the Mitsubishi Company, the primary exposures of the community were to radon gas and thorium, wastes of the chemical separating process. The 60 children who were tested for total blood count and differential, had an average monocyte count of 207 per microlitre of blood. The expected average for children would be 325. The range of monocyte counts was 72 to 495, as against the normal 200 to 800 per microlitre of blood. One hundred seventy one (171) children in a neighboring village, Carey Island, were also tested. These children were exposed to a palm oil factory, and agricultural pesticides and herbicides, but not radioactive heavy metals. These children had a lower socioeconomic status than the study group, and their nutritional status was lower. However, their blood counts, and the monocyte count in particular, were normally distributed.

The Ipoh High Court in Malaysia closed down the Asian Rare Earth factory for two years, for cleanup and construction of a waste disposal building. The Bukit Merah children were tested three months after the resumption of factory operation (1987) and then again one year later (1988). The progressive deterioration was astonishing:

Characteristic	Numer of Children tested	M < 100 per microlitre	M< 200 per microlitre
1987	60	6 (10.0%)	29 (43.9%)
1988	44	13 (29.5%)	25 (56.8%)

About 39% of the Bukit Merah children suffered from a triad of mild lymphadenopathy, congested turbinates and recurrent rhinitis. Less than 4% of the 171 Carey Island children presented with these symptoms. All children in the study had normal temperatures and were without obvious cold or sore throat symptoms. In a follow-up visit to Malaysia in 1989, it was found that two children, 5 and 7 years old, had been diagnosed with acute lymphocytic leukemia. A 19 year old man, born in Bukit Merah and a life long inhabitant, was also diagnosed with acute lymphocytic leukemia. Another 5 year old child developed a malignant brain tumor.

A two year old child died of septicemia, and a 22 year old worker, from the A.R.E. factory, considered by his peers to be "very healthy", died with a diagnosis of meningo-encephalitis. On admission to the hospital, the worker's blood count was reported as abnormally low in view of his overwhelming infection (6,600 per microlitre blood). According to the Malaysian statistics the elevated leukemia rate alone in this population of 15,000, had a probability of 3 in 100,000 of happening by chance. The expected rate was 0.03 cases per year.

It is my hope that more such biomarkers of exposure will be developed, and more community health interventions will be discovered and undertaken at an early stage in the development of environmentally related disease. I hope also that further studies and confirmation of my work will be undertaken, and that new techniques to diagnose and treat communities at risk from pollution will be a major focus of future medical research.

Conclusions

Environmental Health is becoming a new discipline in its own right, different from Occupational Health. I believe that Environmental Health efforts will more and more come to rely on biomarkers of exposure rather than gross biological endpoints such a severe tissue damage or cancer death. The child with its sensitivity and rapid growth rate will become the most important indicator of community health, and will become the focus of major preventive health action.

Environmental health will need to focus on parameter shifts in the population rather than on the clinically abnormal few. For example, when an individual's normal monocyte count is about 400 per microlitre of blood, and due to bone incorporation of uranium this drops to 250 per microlitre of blood, he or she would have a biomarker of exposure but not be clinically ill. The case is obviously clinically more important for the individual who had borderline monocyte count prior to the exposure, and moves into moncytopenia. However, in terms of the community health, community shift and not the plight of the individual is the focus, and community intervention is the response. The entire community needs assistance, not only those who fall below clinical guidelines. The individual care can be relegated to the usual physician patient relationship. This means carefully distinguishing between a normally distributed community parameter with a few abnormal outlayers, and a clearly distinguishable "bell curve" moved from its normal mean value. It is also possible to have communities with bimodal characteristics, that is a subgroup has the biomarker for exposure. This is a new field of health investigation, requiring new thinking and new tools.

In this paper four potential biomarkers have been noted: monocyte count, death rate of low birth weight infants, incidence rate of asthma, and incidence rate of eczema.

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7. Shades of Non-Knowledge — Dealing with BSE in Britain[1]

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Abstract

The context of the following is a study of the implicit models of science and scientific uncertainty prevailing within the respective political cultures of Britain and Germany. It is also about how uncertain scientific knowledge is translated into political decision making. I try to build on a wider understanding of cultural contingencies which shape scientific (non-)knowledge, the construction of risks and public policy commitments. Preliminary findings of the study on BSE/nvCJD in Britain will be presented.

1. Reflexive Modernisation - The Meaning of (Non-)Knowledge

A characteristic assumption of simple modernity was that more and more knowledge, in the form of scientific and technological knowledge and expert knowledge in general, is the cause of changes in society. Non-knowledge was excluded, because it was regarded as irrational and illegitimate. Uncertainty and ignorance were simply negatively connotated and had to be overcome for the progress of society and individuals.

The theory of "reflexive modernisation" (as formulated through Ulrich Beck, Anthony Giddens and Scott Lash, 1994) goes beyond the modernist illusion of overcoming uncertainty, ambivalence, ambiguity and contingency. Conflicts about knowledge are the medium and the key characteristics of reflexive modernisation. Central questions one might ask in order to explore non-knowledge in real-world contexts might include: who knows what, and why, and why not someone else? Moreover, what commitments have been made? And what do those commitments imply about knowledge, possible consequences, responsibility, etc.? Since in certain analyses, e.g. President Nixon in the Watergate affair, the timing of knowledge gain is as important as the question of access to that knowledge (Leiss 1997; see also Wynne 1992).

In reflexive modernisation knowledge is still important, but dealing with non-knowledge, with contradictory uncertainties, seems to be essential where side effects are the driving force of societal change and where non-knowledge actually intensifies and strengthens side effects. This can be seen clearly in the BSE-case.

Ulrich Beck differentiates between five *dimensions of non-knowledge* (1996):
1) selective perception and mediation of knowledge;
2) uncertainties of knowledge;
3) possibilities of mistakes and errors;
4) inability to know;
5) unwillingness to know.

The above implies the crucial distinction between knowledge on the one hand as a discursive tool of

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social actors (where lack of knowledge is always present), and on the other hand, the knowledge, which is usually part of the whole process, but which is not theorised itself. Whereas the first is recognised by social and political theorists and thus can be 'used' in terms of 'politicisation of non-knowledge', the latter is not recognised in terms of reflexivity. Non-knowledge might include for example a lack of awareness of the ambivalence in the own work. It seems that both can fit in the five dimensions identified by Beck.

With his concept of non-knowledge Ulrich Beck adds a very valuable element to the discussion of the status of knowledge in late modern societies. In doing so, he goes beyond the classical ideas of simple modernity which focus exclusively on knowledge. This is still very present, for example, in the work of his co-author Anthony Giddens (e.g. Giddens 1991). But even Beck's theoretical framing is still a concept focusing on the *cognitive* dimension, only. It leaves the *cultural* dimension of unreflected and unconsciously learned and proved social practices, cultural routines and habits outside. Knowledge production - as well as the exclusion of knowledge - need not necessarily to be seen as a deliberate human action. Instead, (non-)knowledge should be considered as a product of unconscious cultural practices and contexts. For example, certain decisions might not be meant to exclude someone because of his/her unwanted knowledge, but because of the way she/he articulates or frames the problem which might appear as inadequate; it might be different disciplinary languages, etc. which lead at the end to an exclusion of a specific knowledge. Several reasons can be imagined which cannot be explained in cognitive terms. Or, as Brian Wynne put this, "(...) social mechanisms of closure around particular logical constructions have to occur in order to complete the otherwise incomplete logical construction" (Wynne 1992: 123). The BSE-case can exemplify this idea in more detail.

Central to this study is: How do we characterise and deal with non-knowledge in respect of BSE? What is the relation of uncertain scientific knowledge to the construction of risk? What does non-knowledge mean in particular contexts and cultures? How is knowledge related to cultural practices? How is ignorance constructed, recognised, excluded, denied, and mediated through different actors in the UK?

2. Relations of Definition

To address these kind of questions, we first have to look for the power relations involved in all of those cases. Consequently we need to look for who has the power to define or as Ulrich Beck has put this “The relations of definition" (see Beck 1988, 1997). This includes the rules, institutions, and resources which identify and define risks and knowledge. In respect of my comparative study about knowledge, uncertainty, risk and BSE the following general questions have to be answered:

1. Who or which institutions define BSE as a risk or (non)risk and what are the presumptions, connected to which notion of consequences? Who carries the responsibility for BSE? And who is identified (positively or negatively) affected by BSE/nvCJD?

2. What kind of (non-)knowledge, hypotheses, rationalities seem to be relevant in respect of causes, dimensions, and for which actors? Which kind of knowledge is excluded, or not accepted and for what reasons? For instance which are the important (= funded) research units of BSE/nvCJD, and who else is involved with BSE/nvCJD without being funded? At what point was there a conscious decision to create ignorance?

3. Who has the burden of proof, and what is accepted as proof or evidence and on what basis?

4. Who decides the questions of liability, cost compensation, control and regulation of the epidemic? For example, what kinds of regulation about BSE were introduced? When? And on what grounds?

I will refer now to the five dimensions of non-knowledge, named by Beck. In order to test the usefulness, the range, and the limitations of these five categories for further discussions on knowledge, uncertainty and skill, I shall focus on the applicability of Beck's concept on the British BSE/nvCJD-case.

The research method used is an analysis of governmental papers, scientific documents and media responses in newspapers. A series of in-depth interviews with key actors of the discourse on BSE/CJD, e.g. scientists and journalists, are a major source of material with which to reconstruct BSE/CJD discourses. Interviews with politicians and civil servants responsible for political decision making on this issue, will follow soon.

The British case study is carried out at the Centre for the Study of Environmental Change at Lancaster

University, supervised by Brian Wynne and kindly supported by ESRC. The German case study, which will follow next year, will be carried out at the Institute for Sociology of the University of Munich, supervised by Ulrich Beck. And I would like to emphasise at this point that these are very first findings on work in progress.

3. The British BSE-Case

“I think it is time to look back to see what lessons we can learn from the disaster of BSE - and it truly is a disaster, the full magnitude of which we do not know"

(Colin Blakemore, one of Britain's leading brain scientists, 12 September 1997)

BSE or 'mad cow disease' as well as the classical and new variant Creutzfeld-Jakob-Disease (CJD, nvCJD) belongs to a group of so called Transmissible Spongiform Encephalopathies (TSE's). BSE was first detected in 1985 and described as a new cattle disease in 1987. In 1988 the very first article was published in the British Medical Journal which suggested the possibility of a transmission of the cattle disease by dietary means to humans (Holt/Philipps, BMJ 1988). This article emerged as a key paper for critical voices to emphasise since that time the risk which might be connected to the consumption of infected beef products. But at the same time the official line was very reassuring: British beef is safe to eat. But nobody knew for sure. The whole BSE saga collapsed in March 1996 with the (rare event of a) common announcement of the Secretary of Health, Stephen Dorrell, and the Agriculture Minister, Douglas Hogg, that "there remains no scientific proof that BSE can be transmitted to man by beef, but (...) the most likely explanation at present is that these cases (of nvCJD) are linked to exposure to BSE before the introduction of the specified bovine offal ban in 1989" (Dorrell 1996). The last sentence indicates already that the problem was seen to be under control and bounded, because measurements of 1989 were already efficiently in place.

The history of the BSE/CJD case is marked by extended uncertainties where at the same time decision stakes are very high. A situation which could be called with Jerry Ravetz and Silvio Funtowicz 'post-normal science' (Funtowicz/Ravetz 1992, 1993). Of course, scientific uncertainty can be a wonderful thing, because it allows, for example, a privileging of the "sound scientific" standpoint endorsed by some, and the exclusion of alternative other standpoints as "irrelevant". Or as one of the interviewee put this (1997):

"If you want to find someone who tells you 'there is no risk at all from BSE' - you could find somebody that will say this. And if you are going to find somebody who says 'a large number of people will die' then you can find someone who says this as well."

This example might serve to illustrate what is meant by the first dimension of non-knowledge:

1 Selective perception and mediation of knowledge,
where knowledge is obviously (mis)used as a discursive tactics to achieve a particular political objective. In another paper (Dressel 1997), I tried to show “why talking of risk could be full of hazards" for some of the people involved in the British BSE-case. In the paper I illustrated the existence of strategies to exclude scientific knowledge through obstruction of the work of scientists; the foiling of general research; intimidation, marginalisation and sometimes even victimisation of individuals. All these strategies can be subsumed under means deliberately used, for example, by political decision-makers or civil servants to favour a particular, a selective, perception of an emerging problem and at the same time to suppress another perception. And I would like to stress here, that the process of exclusion might be grounded in reasons other than only cognitive. Exclusion might occur for unreflected reasons, but might well be consciously enforced.

A lot has been already said about the selective mediation of knowledge and the role the media play in this respect, which is evident. In particular for the critical voices, media were often the only way to communicate their anxieties and warnings about the possible hazards for humans related to BSE, to bring in their deliberately excluded and thus politicised knowledge. On the other hand, the information given by the media to the public displays a very closed institutional response on this food scare. The majority of the media response was in favour of the beef crisis rather than the much more important implications for human health (see also Adam 1997 forthcoming). Even when the likely link between BSE and nvCJD were made, the big issues were EU's beef ban and the defence of British beef industry, including the

argument for 36000 jobs in abattoirs, meat processing and food manufacturing (Workers BSE Inquiry May 1997).

2 Uncertainties of Knowledge

The second dimension of non-knowledge is probably the most important and the most widespread. It is not only connected to the first dimension; uncertainty of knowledge even enables selective perception and mediation of knowledge. Uncertainty of knowledge is an inherent element and always present in knowledge production processes and can only be limited to a certain extent. Whereas uncertainty can be seen as the engine of scientific enterprises, it is also the starting point for political and other kinds of decision making. We just don't know, but nevertheless we need to react. Uncertainty of knowledge is what the BSE-case is all about. The variety of uncertainty seems to be unlimited:

- We don't know the cause of BSE. It might be because of changes in rendering practices (the most used narrative), it might be because of organophosphates (as the organic farmer, Mark Purdey, vividly maintains), it might be that it was imported from the “dark continent", Africa, (as the Independent newspaper recently speculated (see Independent 1 August 1997)).

- We don't know whether BSE exposure, and/or something else, causes nvCJD. BSE exposure might be the most likely explanation. But there are other explanations, too (like the organophosphate hypotheses again, because organophosphates can be found, for example, in certain kinds of shampoos).

- We do not have a sufficient idea about the nature of the infectious agent that causes BSE and CJD. Although a majority of researchers adapt their work according to the prion theory of Stan Prusiner (for example, Prusiner 1984); several others stress that the mechanism of prions are not explained through this theory. Thus, the agent might be instead a special kind of virus.

- We do lack a lot of calculation like, how much infected meat we've eaten, or the number of infected cattle in the abattoirs. Although these calculations would have been extraordinary important, they were just not carried out, sometimes even deliberately prevented by some political institutions.

- We are still not sure whether the measures that have been taken (specified bovine offal ban, ruminant feed ban) are sufficient to prevent further victims of the new variant CJD.

This list gives only a partial impression of the range of uncertainty engaged in that case. But nevertheless it is easy to see the problematique of decision making and developing ideas to fight against these kind of diseases in the face of such an extent of uncertainty. Moreover, the Transmissible Spongiform Encephalophathies (TSE's) in general were considered such rare diseases (for example, the classical CJD occurs only once in a million) or were thought to hold no risk for humans (like the sheep disease, Scrapie) so that only a few researchers world-wide were interested. Before the outbreak of BSE it seems there was only one British institute, working since the 60s on TSE, and in particular Scrapie. This was the former Neuropathogenesis Unit, now Institute for Animal Health, in Edinburgh. The same is true for CJD: only a handful of researchers were involved in this field. Thus, when BSE occurred there was only a very limited amount of knowledge available on which to draw.

3 Possibilities of Mistakes and Errors

Uncertainties in knowledge about BSE/nvCJD led inevitably to the third dimension: the possibility of mistakes and errors. The example of the myth of BSE as a “dead-end-host" might illustrate this. Whereas, like any transmissible disease, “the possibility that BSE might transmit to humans has been acknowledged since the disease was first recognised in British cattle" (Jeffrey Almond, member of the governmental Spongiform Encephalophathy Advisory Committee (SEAC), 1995), this was just not considered a basis for any political decision-making process. Only a few critical voices continuously stressed this fatal possibility of the disease of jumping the species barrier. Instead, the official scientific advice, given by the first governmental scientific advisory committee, the Southwood Committee, and emphasised by the Government went:

“From present evidence, it is likely that cattle will prove to be a “dead-end host" for the disease agent and most unlikely that BSE will have any implications for human health" (Southwood Report 1989: 21). Unfortunately, and in particular annoying for the members of this committee, was the fact that usually nobody - neither official, nor the media - quoted the following, highly important, sentence: “Nevertheless, if our assessments of these likelihood’s are incorrect, the implications would be extremely serious" (ibid).

The scientific and political claims just relied upon the assumption that BSE would not jump the species barrier. As a direct consequence, members of the ministries and the cabinet stressed that eating British beef is safe. Prime Minister John Major, in December 1995 said, “I am advised that beef is a safe and wholesome product. The Chief Medical Officer's advice on the point is clear - there is no evidence that eating beef causes CJD in humans."

But unfortunately, this information appears to be wrong. For, since 1995 the first victims of new variant CJD led to the fact that the scientists “ran out of alternative explanations (...) the most likely explanation for the nvCJD is the consumption of BSE infected meat" (Rob Will, head of the CJD Surveillance Unit, 1997).

4 Inability to know

A major dimension in all knowledge generating processes is the general inability to know. The inability to know in an epistemological sense. But it can also include, according to Beck (1996, 1997), as well a knowledge that is known but repressed. There will always be things we don't know, things we might not ever know. The discussion about the precautionary principle has this concept of the inability to know at its very heart. The precautionary principle deals with threats of serious or irreversible damage where a lack of scientific certainty or inability to know should not be used as a reason for postponing measures or policy making. But unfortunately, even no response must be seen as a certain kind of response. And in avoiding doing action, we are taking action. There is no way out of decision making - even if we don't know. In the light of inability to know, decision making becomes a question of accountability and societal acceptance. An example of the inability to know in the BSE saga can be seen at the end of the 70s, when farmers got cheap offers of high protein cattle feed, made out of recycled sheep and cattle remains. It seems to be still unclear whether the farmers knew about the origin of this cheap alternative to the more expensive soya bean feed. Moreover, it seems unlikely that the farmers were aware that, by introducing this new feeding praxis, they actually transformed herbivores into carnivores, and indeed cannibals. They were only told that it would do good to their stock. But already at that time, some initial critical voices arose in the context of this recycling praxis in 1979. For e.g. as a member of the Royal Commission of Environmental Pollution Hans Kornberg suggested that this issue be given serious considerations (quoted, in World in Action, 17.06.1996):

“The major problem encountered in the recycling process is the risk of transmitting disease-bearing pathogens to stock and thence to humans."

But this warning appeared not to be widely acknowledged. It was only dug out after the events of March 1996. There might have been some warning, but really, nobody knew. And at that point we need to refer back to the specific idea of the precautionary principle in the cultural and institutional context of Great Britain. Because this principle seems not to be accepted widely by agricultural policy community or within UK government (see Winter 1996). Instead there is a strict reliance on arguments derived from scientific evidence; the “sound scientific" standpoint dominates any public policy domain, even when - like in the BSE-case - the precautionary principle might have been better suited. Although there remains of course always the question of precaution for whom? Because in the BSE-case one might argue that public policy took clear precautions - for the British food industry. But as Tim Lang, Professor of Food Policy, has put it, "the Ministry of Agriculture, Fisheries and Food is the only ministry to my knowledge which has destroyed an industry they claim they are in business to promote" (Lang, in World in Action, 17.06.1996).

5 Unwillingness to Know

Whereas, as stated, an inability to know can embrace in Beck's sense a knowledge which may initially be known or repressed and thus lead to an inability to know, there is also a status of deliberately not willing to know. And often the persons or institutions affected most are the persons or institutions which are at least willing to acknowledge that they are might be exposed to a risk or a hazard (see e.g. people living in the surrounding of nuclear power plants). This seems true for the BSE-case, too. To understand this we need to explore the pre-history of the BSE saga. BSE occurred in Britain immediately after two other food scares, Salmonella and Listeria, had been major public issues. When it came to BSE, the public policy domains were very worried that they might become the target of public displeasure again. Thus, as my research indicates, there must have been a decision to stop any further discussions or arguments about a possible relation between BSE in cattle and a human threat. Several interviewees even suggested a deliberate governmental decision that everything was OK, which seems to be not only a reassurance of the public but of the Government itself. One interview excerpt taken out of a talk to Stephen Dealler,

microbiologist and major campaigner for the risk involved in the BSE-case, might give an idea of this deliberate unwillingness to know (1997):

Interviewee: “For a long time I presumed that they were carrying out the research for themselves, but they were just not telling anybody. So they wanted to know themselves, but they didn't tell it to others. (...) But I found that this was not correct. I found that large amounts of the research which was most obvious was not carried out. They did not research at all to look for methods of treatment, they did very poor research to look for methods of diagnosis, they did not even make calculations to look for the numbers of infected cows that were being eaten. I can find some sort of calculation but nothing official.”

Interviewer: “Why do you think that they are not looking for such obvious things?”

Interviewee: “The impression I get is that they have completely convinced themselves that there is no risk.”

And there were good reasons for the Government to take over this standpoint: The cost otherwise (e.g. to slaughter without any proof the whole British cattle stock) would have been enormous, billions of pounds. Thus, among plenty of reasons for a general unwillingness to know, the economic aspect appears to be quite a striking one.

5 Conclusion

These examples chosen from the British BSE/nvCJD-case to illustrate the concept of non-knowledge of Ulrich Beck show that the five dimensions of non-knowledge are not always of good selectivity. Several examples can be used and explained in other dimensions. The first three dimensions (selective perception and mediation of knowledge, uncertainty of knowledge, and the possibility of mistakes and errors) proved to be unproblematic and clear distinguishable analytical categories. Whereas, the last two dimensions (inability to know and unwillingness to know) are not as apparent as they promised to be, moreover rather difficult to handle and to separate from each other in a case study. The major problem emerged with the addition of Ulrich Beck that an inability to know "may in turn be known or repressed" (Beck 1997a: 7). If I know something and I repress it, how can I separate this from the analytical category, unwillingness to know? What means not willing to know other than to know something and to be not willing to be aware of it? One idea for a greater specification of these categories might be as follows: Why not put the inability to know category as an exclusive category for an *epistemological* inability to know? What do I mean by that? The basic, epistemological inability to know embraces the idea that we are always confronted with fundamental non-knowledge, because of human limitations of senses, of perceptive faculty, of general powers of imagination, and of human capacity for thoughts. But epistemological inability to know does not include a deliberate or maybe unconscious human action to repress something which was known before. I would suggest to leave this idea for the fifth dimension of unwillingness to know.

Though this modification emerged as a necessary one in the case study, this critique should not be mixed up with a general weakness of explanatory power. Instead, Ulrich Beck's concept highlights the difficulty of dealing with epistemological and ontological questions in the age of reflexive modernisation dominated by concepts like uncertainty, ambivalence or contingency where many of the uncertainties have been created through growing human knowledge and growing human manipulation (e.g. of nature or of the social world, too). Moreover, what makes the richness of the concept is the attempt to address such different aspects of knowledge as uncertainty, mistakes, human inability and human unwillingness and selectiveness.

The non-knowledge concept is a useful analytical and theoretical tool to explore, to categorise and to describe an empirical case. On the other hand, the emphasis on cognitive dimensions of non-knowledge in this concept has limitations in *understanding* British policy on risk management. If we refer back to the unwillingness to know dimension, is this dimension considered as an universal one in Beck’s approach? Or is it instead culturally contingent? For example, social and cultural contingency may well result in different framings and perceptions of what counts as a risk. The same might apply to the other four categories.

The BSE-case has proven to be not only a case of having to cope with enormous amounts of non-knowledge, but also one which has proven to be a very *British* case, too. Though the analysis is still not

finished and only first results are shown, it is well possible to define very British elements in this discourse, which permits one to write about *knowledge as culture*. There are numerous examples to illustrate that, but for the sake of brevity I will focus only on two.

For example, if we look on the precautionary principle, we find that this idea is well used in the United Kingdom, but is reinterpreted to exclude ignorance. That is, precaution comes in only when you can specify the actual damage process, as if the damage process and uncertainties are the only relevant ones. Brian Wynne has vividly put this as: "The response (of the UK political culture, K.D.) has been that if things are uncertain they could therefore turn out better - there is no reason to assume the worst" (Wynne 1992: 120).

Another example for the “Britishness” of the BSE-case is the high concentration of power of definition in this case in the Ministry of Agriculture, Fisheries and Food (MAFF). Although the BSE/nvCJD-case is as much a health issue as it is a question of animal welfare and food industry, it is treated almost exclusively in the public domain as a matter for MAFF. One possible explanation for this, I was given in one of the interviews: In political terms the Department of Health (DoH) is seen very much as an institution *spending* taxpayers money, whereas the MAFF is seen as an institution *recruiting* money through food production and food distribution. Thus, MAFF is a much more powerful institution than the DoH, and certainly in the BSE/nvCJD-case. For example, all infectious material (e.g. the BSE cows) belongs to MAFF. If an animal is suspected of having BSE it becomes automatically the property of MAFF. Any research project on BSE needs the permission of MAFF to work on this issue, and furthermore, the ministry has to provide the infectious material. However, historically MAFF has a greater obligation to farmers and food industry than to consumer or health interests (for an historical overview for the relation between MAFF and the National Farmers Union, see Winter 1996).

These two examples might give an impression of the suggestion that cognitive explanations are not sufficient enough for an understanding of how knowledge and non-knowledge is constructed, recognised or denied and mediated. We need to take into account and explore more cultural, institutional and social practices, habits and routines to get a more complete, but certainly a richer picture of the construction of knowledge, uncertainty, risks and skills in late modern societies.

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8. The Development of Maximum Acceptable Concentrations as an Example of Social Learning. Indeterminacy and Conditionality of Toxicological Standards[1]

C.L.E.G. Adriaens[1]

Abstract
The development of standards, to cope with the threat of hazardous substances, depends on scientific information and on practical circumstances. The application of science to practical circumstances is not unproblematic, because of con-strains from the application context. The concept of `social learning', with reflexivity and interaction as key elements, elaborates on this view. The establishment and implementation of the Maxi-mum Acceptable Concentrations in the Dutch practice of occupational toxicology is described. The procedure to set these standards involves both scientific and societal actors. This procedure can be characterised as a process of partial reflexivity, because not all subprocedures are subject to scrutiny, and partial interaction, because not all involved parties have the same opportunities to influence the method, content and outcome of the procedure. Although a large social acceptation of the standard is generated during the procedure, this does not mean the standard and associated measures will be used in the intended way in every situation: indeterminacy of knowledge occurs. One could speak of internal institutional learning, because the institutions are learning mostly from their own perspective and experience, and to a lesser extent, the perspec-tive and experience of others.

Introduction

Setting standards for hazardous substances is one of the strategies to cope with the threat of environmental degradation. The permitted concentration of dangerous substances like pesticides or solvents in food products or in environmental compartments as air, water or soil is restricted by these standards to a certain maximum. The actual standard of such a dangerous substance depends on practical circumstances and on scientific information. As evaluating studies on the subject of standard-setting show, the application of scientific knowledge to practical circumstances can be problematic. Indeterminacy and conditionality of knowledge can occur. Indeterminacy in the sense that it is impossible to take into account all possible situations and factors in the context of the application of standards. Conditionality of knowledge in the sense that, to allow a standard to be set, precommitments on the situation of production and the application of a chemical have to be made during the standard-setting procedure. These precommitments do not have to correspond with the actual risk situation.

This view is stressed by the work of Brian Wynne who investigated the scientific basis of safety standards with regard to industrial hazards. One of Wynne's conclusions is that scientifically based standards may lack reliability in field situations. The reason for this is that scientific methods presume experimental conditions which do not match field conditions, e.g. social and institutional aspects. As an example, workers and farmers do not always behave according to prescribed rules, as is presupposed in safety experiments. In the case of setting standards for the pesticide 2,4,5-T in the UK, it was assumed that farmers would use correct solvents, proper spray nozzles and full protective gear, in spite of the inconvenience (Wynne 1989, 37). As a consequence, such scientific risk evaluations have a limited value and must be supplemented by insights obtained from practical experience.

Thus, it can be concluded that the development of scientific knowledge is conditioned by precommitments and connotations of knowledge. In addition, social and institutional factors may reduce the applicability of scientific knowledge in practice. This conditionality of scientific knowledge may lead to conflicts between experts and laymen. Both parties may complain that the other does not take their claims regarding risks seriously. Scepticism or even disbelief on scientific claims, on the one hand, and accusations of irrationality and naivety of the public, on the other, are well known in several debates.

[1] This paper has been presented at the Uncertainty, Knowledge and Skill Conference, Limburg, Belgium, 6-8 November 1997.

Such situations may block progress in reduction of industrial and technological risks. To make way for a solution, Wynne suggests that `... *digging out the buried social assumptions in both expert and public discourse about risks and technology, and finding the means of debating them openly, is the central challenge if we are to progress beyond the current sterile predicament in technological risk management. (..) Both experts and laymen need to be encouraged into processes which articulate their tacit assumptions, and allow negotiation between them; this means institutional as well attitudinal development.*' (Wynne 1989, 36). Wynne elaborates this vision in the concept of `social learning' which takes into account these limitations of scientific knowledge. Besides considering conditionality seriously, it is characterized by the recognition of the legitimacy of non-scientific sources of knowledge, organized in other institutions (Wynne 1992).

One important aspect of social learning is reflexivity. It means the recognition of different sources and types of knowledge by an institution or actor, including its own knowledge. Conditionality and limitations of knowledge are elaborated within this concept. This attitude creates a basis for the other dimension of social learning: interaction. This term refers to the serious involvement of other actors and institutions. This leads to negotiation on mutual influential knowledge, which exceeds the boundaries of the different paradigms of the actors. Learning institutions do not exclude their own structure, power and social relations of the debate on risk. Social learning may therefore have many consequences for the actors involved. Reflexive and interactive learning combines self-exploration and intensification of relationships with other actors and their forms of knowledge and experience. This type of learning process has no preordained or guaranteed direction: it needs recognition of the different values, identities and knowledge to be possible (Wynne 1992).

Other authors have developed similar concepts. Constructive Technology Assessment (CTA) (Boxsel 1994, Smit & Leyten 1991, Bunders 1990), in particular, should be mentioned. CTA aims primarily to influence technological development by taking into account the infrastructure, production processes, products and services and consumers at all stages. It tries to encourage and to extend the relations between the actors involved. This is made possible by building networks, in which producers and users of a technology meet (Smits & Leyten 1991, 331-332). CTA aims at implementing that kind of technology on which all involved parties agree. A number of criteria are set, which the context of interaction between the involved parties (laymen and experts) has to satisfy, such as the willingness of the involved parties to negotiate and to accept equal power to a large extent. A comparable set of criteria is drafted for the process of Risk Communication (RC). RC is defined as "an interactive process of exchange of information and opinion among individuals, groups, and institutions" (National Research Council 1989, 21). Specifically, this process is defined by levels of involvement in decisions, actions, or policies aimed at managing or controlling health or environmental risks. An example of an operationalization of different levels, though not quantitatively defined, is the so-called Ladder of Citizens Participation (Hance et al. 1990, 33). This Ladder describes different levels of lay participation in government decision-making. The rules for institutions who want to use RC include accepting and involving the public as a legitimate partner, listening to the public's specific concerns, and the display of honesty, frankness, and openness (Covello & Allen 1988).

In this article we describe the establishment and implementation of standards, the so-called Maximum Acceptable Concentrations (MACs) in the Dutch practice of

occupational toxicology. A MAC is defined as the Maximum Acceptable Concentration of a gas, vapor or substance in the air at the workplace, which does not harm the health of employees and their progeny, during lifespan and repeated exposure, according to the state of knowledge during the establishment of the standard (NIA 1995, 137). In this study the role of the so-called Three-Part Procedure -- henceforth also the Procedure -- is emphasized, a procedure which is followed when standards for new substances are needed or a current MAC has to be modified in the Netherlands. The three parts involve the establishment of a health-based standard, the socio-economic feasibility evaluation and the final policy decision. The first part is executed by scientific experts, the second involves societal actors such as organizations of employers and employees, the third and last part is the task of policy makers.

Thus, the Three-Part Procedure is characterized by the involvement of both social and scientific actors, experts and laymen. In addition, users appreciate and express confidence in the resulting standards, and the procedure itself is not only appreciated in the Netherlands, but also has an impact on international procedures for setting health standards (Maas 1993, Stijkel 1995, Bal 1999). Therefore, it seems as some of the characteristics of the procedure differ in a positive sense from cases studied by Wynne. The question is whether or not this can be due to some kind of social learning. Institutional conditions seem to be satisfied, because of the possibility of participation by both experts and laymen. However, social learning involves more than mere participation. Do the actors behave on a reflexive way and do they interact with each other? If so, does this indeed lead to an improved and safer practice of dealing with toxic substances?

First we will describe the operation and generation of the Three-Part Procedure. The procedure itself is described, with its principle participants and the interaction between them. To evaluate the reflexivity in procedures with regard to the involvement of other actors, some important changes in the institutional and procedural aspects of the standard-setting process are described. Accordingly, we shall analyze the use of the resulting MACs in the practice of work environment control, illustrated by some examples from agricultural business. This way, evaluation can be made as to whether the interaction is sufficient. In the discussion, we shall interpret our data in the light of the concept of social learning, in both the descriptive and the normative sense.

Operation of the Three-Part Procedure

The Three-Part Procedure consists of three phases in which scientific, socio-economical and policy deliberations are separated (figure 1). The first phase of the procedure involves the determination of acceptable levels of exposure to toxic materials: the Health-Based Recommended Occupational Exposure Limit -- henceforth called the Recommended Limit --. This is done by the Dutch Expert Committee on Occupational Standards -- henceforth the Expert Committee --. Members of the Expert Committee are scientific experts, recruited from universities, research institutes and industry. A second study, executed by the MAC Commission, evaluates the socio-economic feasibility of this Recommended Limit. The MAC Commission includes representatives of employers' organizations, trade unions and governmental departments. Finally, a policy decision is made and a MAC established. The Ministry of Social Affairs and Employment -- henceforth the Ministry-- coordinates the procedure and is responsible for the final policy decision. The three stages may produce three different sets of

recommendations (Nationale MAC-commissie, Werkgroep van Deskundigen 1978, Kolk 1993).

Of the 30.000 known chemicals, only some 900 have been assigned a MAC. About 100 of these MACs have passed through the Three-Part Procedure and have acquired a legally binding status. The other 800 are more or less administrative guidelines, mostly based on foreign practices (NIA 1990, 232-233). It can take several years for a chemical to complete the Procedure. Consequently, one has to choose which chemicals should be given first consideration. To make these priority decisions, a Working Program is been set up. In this program, the Ministry drafts a list of chemicals that are used extensively throughout the Netherlands. Next, this list is presented to the MAC Commission (NIA 1995, 140). Sometimes advice is solicited from such sources as professional associations. The resulting set of priorities is sent to various business associations, which are then required to register if they want to contribute to the feasibility study on a certain chemical (Brokamp 1996). Business associations which do not register are given only cursory consideration in the subsequent feasibility study.

The Procedure itself starts when the Ministry requests one of three preliminary advisory boards to collect and interpret scientific publications on a number of the chemicals listed in the Working Program (see figure 2). The results of this initial study, which includes a proposal for a Recommended Limit, are presented to the Expert Committee. A selection of committee members discuss and possibly revise the report and present it to a plenary meeting for general discussion. The process results in the drafting of a public document, which is then sent to all interested parties, including foreign experts and specialists from private industry. The logical and scientific merit of the comment provided by these interested parties is subsequently evaluated by the Committee, and final adjustments to the draft report are made in response to them. Finally, the Expert Committee writes a so-called criteria document and proposes a Recommended Limit on behalf of the Dutch Health Council (Kolk 1993, NIA 1995, 139).

This document is sent to both the Ministry and the MAC Commission. At this point, the second stage, the evaluation of the socio-economical feasibility, begins (NIA 1995, 139). The MAC Commission approaches the business associations that have registered their involvement with the chemical to ask affiliated companies to assess the economic and technical feasibility of the proposed Recommended Limit. The responses from these companies are collected by the business associations, delivered to the Commission and discussed by its members. If insurmountable disagreements arise, new field studies can be commissioned and/or prior collected data re-examined (Brokamp 1995, Ulenbelt 1995).

The Ministry deliberates on policy and political consequences. It is also the legally empowered authority responsible for the institution of MACs. The MAC is incorporated into the Orders governing the Work Environment. This legal status of a MAC is then made public in a press release (NIA 1995, 139).

Within the Procedure, a strong case-to-case approach is emphasized at every point in the formulation and implementation procedure. For example, the manner in which scientific information is interpreted when drafting a Recommended Limit depends on the available scientific information about a particular chemical and the scientific quality of this information. Criteria for processing information depend on such general principles as Good Laboratory Practice, as well as on non-operational factors and skills, such as the expert judgement of Expert Committee members (Nationale MAC-commissie, Werkgroep van Deskundigen 1978, Beems 1993, Swaen & Sturmans 1993, de Mik 1993).

Generation of the Three-Part Procedure

Before the Three-Part Procedure was introduced in 1977, companies themselves and agencies engaged in work environment control adopted foreign standards. Dutch authorities felt that standards better suited to the Dutch working environment should be established. In addition, experiences with American and Russian regulatory practices demonstrated that the relation between the scientifically recommended levels of a toxic substance and the corresponding standard was sometimes unclear: the reliability of scientific data could not (and still cannot), in many cases, be fully evaluated. This imprecision was seen as undesirable. Therefore a process was designed in order to address specifically Dutch practices and, additionally, to prevent interference between scientific and socio-economical deliberations: the Three-Part Procedure (Brokamp 1987, Maas 1993). With the introduction of this procedure, its designers have made clear that the determination of scientifically recommended levels should be detached from socio-economic feasibility studies and final policy decisions (Nationale MAC commissie, Werkgroep van Deskundigen 1978, Kolk 1993).

Two new institutions were created in order to undertake the first two parts of the procedure, the determination of scientifically recommended levels and the feasibility study. In 1976 the MAC Commission was established. In 1977 the Expert Committee was constituted. Both commissions are

answerable to the Ministry (NIA 1990, 231, Kolk 1993). The basic responsibilities of these three main agencies has remained the same. The Expert Committee is responsible for establishing the Recommended Limit, the MAC Commission takes care of the feasibility study, while the Ministry sets the final standard, formulates the MAC and coordinates the whole procedure. Minor adjustments to the procedure have occurred, since some of the steps proved unsatisfactory. The Procedure itself and procedures, such as those involving business associations, were formalized and standardized, as following examples will illustrate.

When the Procedure was first introduced, the so-called criteria documents were drafted by the members of the Expert Committee. Because this work was so time consuming, a number of external scientific institutions were asked to take over the task (Bal 1999). The publication of a public draft document also did not occur when the Expert Committee was first constituted. This method of communicating was not introduced until the beginning of the eighties. All together, it took ten years to develop a practical method for drafting criteria documents governing the determination and monitoring of Recommended Limits (Kolk 1993).

In the beginning, it was, additionally, not deemed necessary to priorize the substances to be considered (Kolk 1993). In 1986, a procedure for setting priorities was first drafted. Presently, the Three-Part Procedure is prepared by a Working Program that ranks the chemicals that should undergo the procedure. The place of a particular substance on the list depends on the extent of its use in the Netherlands, the size of the exposed population and the gravity of the possible adverse effects (NIA 1995, 139).

When the Procedure was introduced, information necessary to execute the feasibility study was requested from companies by the organizations of employers and employees. This method did not prove to be satisfactory. To deal with this problem, the Ministry gave an external consultant the task of making inventories of the workplace. However, this gave rise to other problems. Inventories of the workplace no longer took place because they were too costly, they lengthened the process and made the MAC Commission redundant (Brokamp 1995, Kerklaan 1995). Since 1994 the business associations have been used as intermediaries, because they have the most direct contact with companies (Brokamp 1996).

According to the MAC Commission, it is sometimes difficult, in the feasibility evaluation, to involve companies which could have a vested interest when a MAC is to be established (Brokamp 1995). For example, a problem is that within the business associations there is lack of appropriate expertise to evaluate whether a certain chemical is being used in allied companies, and what kind of problems this chemical could cause. To prevent these kinds of problems, business associations are informed on a regular basis, and, when a feasibility study has to be executed, a standard form is used with the associations being explicitly asked to use this form (Brokamp 1995, 1996).

The essential elements in the procedure are its three independent stages: the scientific analysis, the socio-economic feasibility study and the formulation of policy. As the following example illustrates, this formal independence has been reinforced and embedded more and more institutionally. When the Three-Part Procedure first came into effect, the MAC Commission reported directly to the Ministry, and the Expert Committee, as a MAC commission work group, reported directly to its parent commission. This organization cut some of the administrative red tape, but it also had several disadvantages. Despite the separation of tasks within the Procedure, scientific aspects of documents were initially discussed by the MAC Commission. This problem was solved in 1986, when the institutional structure was changed so that the Expert Committee no longer had to report to the MAC Commission but directly to the Ministry (Brokamp 1987, Bal 1999).

Implementation of MACs

Hitherto, we have seen how different actors are involved in the Three-Part Procedure. However, one of the important aspects of social learning is the extent to which a standard-setting process is capable of taking into account the different rationalities of different users. To study the extent to which precommitments are made, we shall describe the policy of preventing exposure to chemicals in the Netherlands. The case will be illustrated with some examples from the agricultural sector. Emphasis will be placed on when and how concentrations of chemicals in the air at the workplace are monitored and compared with standards such as MACs.

By law, every employer is obliged to take care of the health of his employees at the workplace (SZW 1990). This includes the *effective* prevention of exposure to chemicals. `Effective' stands for taking

measures meant to reduce the exposure; these ought to result in the absence of health hazards and nuisance. In Work Environment legislation, the so-called Strategy of Occupational Hygiene -- henceforth the Regime -- aims to reduce exposure to health hazardous chemicals. The key points in this Regime are measures as close as possible to the source of exposure (Westenend & Spee 1994, 4-5). By means of these measures, such as ventilation, the employer has to guarantee the health of the employees (Bosch et al. 1994, 130-131).

It is sometimes difficult to take the measures described by the Regime, as is seen in the agricultural sector. Specific measures for particular chemicals are not taken in actual practice because most agricultural companies are small, often with less than 15 employees, and do not use a particular pesticide on a regular basis. Investments in more source-oriented measures, in line with the Regime, are not made. Therefore, there remains only the use of personal protective equipment to prevent exposure to chemicals in the agricultural sector (van Dijk 1995, Neefs 1995). However, even this ultimate step recommended by the Regime gives rise to problems. One of the problems, occurring with the use of personal protective equipment, is that this equipment is physically heavy in usage. Furthermore, personal protective equipment is sometimes not used optimally, because of a lack of knowledge of how to use it (Werkgroep Arbo 1994). Protective equipment is, even if it is available, not used at all, because users are not concerned with working safely. This results partly from a kind of hardiness and cultural constraints, and partly because risks are seen in the context of "it will not happen to me". Exposure to chemicals often produces effects in the longer run, people are not confronted immediately with them (Boesten 1993).

Recently, companies are obliged to give evidence, by means of a Risk Survey, that the situation at the workplace does not harm the health of employees. This Survey consists of a Risk Inventory and a Risk Evaluation. The Inventory aims to survey the health risk activities of employees. Evaluation of risks compares the results of this inventory with the present regulations, standards and commonly recognized (scientific) insights. To execute this Survey, an Occupational Health and Safety service -- henceforth called Expert Service -- has to be employed (NIA 1994, 436-437). Using this Survey, the extent of exposure is mapped out and reduced (Dirksen et al. 1993, 44-52). It is stated that, when measures already token seem to be satisfactory, the concentration in air scarcely needs to be monitored (van Dijk 1995, Schliszka 1995). The Labor Inspectorate monitors the level of exposures only by exception, if reasonable doubt exists about the situation in a company, and the employer is not willing to take measures (SZW 1993, Bosch et al. 1994, 29-30, Westenend & Stevens 1994, 22).

Only a small part of the companies, mostly larger chemical industries, monitors levels of exposure in everyday practice. The frequency of monitoring varies from business to business. Monitoring mainly takes place within the framework of obtaining background-information, to check if the measures taken are satisfactory. According to the MAC commission, especially when data can be obtained from corresponding situations in other companies in the Netherlands or even abroad, companies and Expert Services do not monitor sufficiently (Brokamp 1996). The reasons given for not monitoring extensively are: monitoring is too expensive and too labor-intensive, and it can be unreliable. When the results of monitoring are checked, threshold limit values such as MACs are not used in all cases (Breteler et al. 1994, 54-55).

Thus, the concentration in the air at the workplace is seldom monitored in everyday practice. Safety depends on measures as specified by the Regime, and these measures are controlled by the Labor Inspectorate. The MACs, and derived standards, are important when a Risk Survey is made, or if reasonable doubt exists whether the measures are sufficient to prevent exposure. MACs are also used for the design of machines and the layout of workrooms (Maas 1995, Brokamp 1996). According to actors involved in implementing the standard, the MAC does fulfill these purposes, certainly in the industrial sector. In the agricultural sector, the measures associated with working safely with pesticides are not always taken.

Discussion

In the cases studied by Wynne, conflicts between laymen and experts arose sooner or later. Wynne has defined social learning, and connected it to reflexivity and interaction. With help of concepts from Constructive Technology Assessment and Risk Communication, the features of reflexivity and interaction can be operationalized further.

Reflexivity can be operationalized according to the causes of conflicts as mentioned by Wynne (1992). If the learning institution recognizes these causes and is willing to evaluate and adjust its meanings and acts, it can be called reflexive. This means that the institution recognizes its own social precommitments

and the results they have on the outcome of a process (the conditionality of knowledge), is willing to scrutinize these social precommitments, recognizes the indeterminacy of knowledge, and is willing to adjust its own constructions. CTA elaborates on this insight, by stating the actors involved in the process should not only have knowledge of their own constructions, but should also be informed and capable of understanding and appreciating the constructions of other actors.

The other aspect of social learning is the feature of interaction. Conditions for interaction, named by Wynne, by CTA and RC, are the creation of trust and consensus by means of frankness and calling in other (lay) knowledge, by taking other rationalities seriously, not only that of the "experts": a diversity of rationalities is present in the process, and negotiation takes place between laymen and experts with regard to this knowledge. Social learning aims at achieving a great deal of consensus between experts and laymen. Combined with the features of interaction and reflexivity, this means that a process with a large proportion of social learning converges, creates consensus, and is characterized by interaction, frankness, openness and negotiation.

Reflexivity, interaction and negotiation in the Three-Part Procedure itself

The design of the Three-Part Procedure requires no interaction taking place between the scientific deliberation, the evaluation of feasibility and the establishment of policy. Three separate discussions are held, in which the outcome of one discussion becomes the starting-point for the next. The Procedure itself, with the division in strictly separated phases, is not open for discussion. Since the introduction of the procedure, the choice has been made for the deliberation of scientific, as well as socio-economical and policy/political knowledge, and a clear separation between the three. The designers of the procedure have appreciated the existence and importance of different rationalities. It could be stated that these designers recognized the conditionality of knowledge, and were willing to take into serious consideration the knowledge of other than (scientific) experts, such as people who have personal experience of the situation at the workplace. Maas (1993), who was personally involved in the Procedure on behalf of the Ministry, attributes the success of the Procedure to the recognition and distinct situation of the different kinds of deliberation.

The sub-procedures, structures and other constructions within the three parts are subject to constant evaluation and adjustment. In every step of the procedure, formalization and standardization of (sub)procedures seems to increase. A strong case-to-case approach is evident in every part of the procedure of establishment and implementation. The criteria for the treatment of information depend on general scientific methods and on non-operational factors, or skills, such as the expert judgement of members of the Expert Committee. Reflexivity occurs to that extent that, within the three phases, one is both willing to scrutinize and adjust sub-procedures, and one accomplishes these adjustments. However, the essence of the procedure, the independence of the three phases, is not subject to scrutiny. Some methods, too, as when evaluating scientific data for instance, are hard to scrutinize, because they involve implicit rules and personal judgement of the experts. Because of this, the Three-Part Procedure can be seen as a case in which *partial* reflexivity occurs.

Interaction is expressed by the increasing involvement of other actors. As early as the drafting of a Working Program, the actors involved in the (future) implementation of a MAC are informed and asked to respond. Also in later phases there is the constant aim to involve actors who will be engaged in the implementation, in the establishment of MACs. For example, during the first part of the Procedure, a large number of experts, both Dutch and foreign, from both the commercial sector and the academic field, are asked to respond to the drafted document. The evaluation of feasibility makes it necessary to ask the business associations to contribute knowledge present in the affiliated companies, with regard to socio-economical and technical feasibility. The clear intent in the MAC Commission and the Ministry is to enlarge the interaction with even more social actors. For example, the MAC Commission has adjusted its methods to involve more concerned persons/parties. By performing these activities, the institutions are able to anticipate changes in the implementation context during the procedure, and are not confronted with unforeseen problems afterwards. Also, when actors involved in the future implementation of standards participate in the procedure, a broad social consensus for these standards is created.

Within the three phases, interaction and negotiation seem to occur to that extent that the structure of the commissions facilitates the possibility of negotiation between representatives of various disciplines (Expert Committee) or various interest groups (MAC Commission). However, the choice who will or will not be a member of the commission has its own constraints. The process of the involvement of other actors does not have the nature of a dialogue. Negotiation takes place only within the commissions

themselves. Although information provided by the business associations in the MAC Commission and the comment brought in as a result of the public draft-document in the Expert Committee is used in the discussions within the commissions, the providers of this information do not have the opportunity to influence the way their information is treated.

Even though parts of the Procedure have a public character, such as the public draft document, the negotiations inside the commissions themselves are not held in public. Afterwards, the providers of information receive an argumentation why their information is used or not used, and how it is used, but they are not allowed to witness or take part in the processes of negotiation within the commissions. The feature of openness answers only to those directly involved in the discussions within the commissions.

Although the feature of interaction, according to Wynne, does occur in the process, the criteria originating from CTA, such as openness, the providing of information and the extent to which all involved parties become more capable of really unfolding activities are not completely satisfied. The Three-Part Procedure can be characterized as a case in which *partial* interaction occurs.

Implementing a standard: indeterminacy and conditionality of knowledge

A problem is how to cover all rationalities of all possible users of a standard. In the case of the establishment and the implementation of MACs, actors from the business sector express confidence about the MACs, especially those established by means of the Procedure, and appreciate these standards. Compared to cases studied by Wynne, the establishment and implementation of MACs seems to be an improvement in this aspect. An explanation can be found in the partly reflexive and partly interactive nature of the Three-Part Procedure. The user of MACs possesses knowledge, and this local knowledge is taken seriously during the establishment of standards.

However, the monitoring of the concentration of a certain chemical at the workplace, and comparing this to the MAC or a derived limit, rarely happens. In general, one relies upon visual control, as well as upon measures such as those mentioned in the Strategy of Occupational Hygiene. These measures are seen as sufficient in effectively preventing exposure in everyday practice. The reason for this can be found partly in the socio-economical context: monitoring is too expensive. Other precommitments, with regard to the social model used by the actors involved in the establishment, are not fulfilled. An important factor seems to be the indeterminacy of knowledge: every situation of application is different. All of these matters would also apply on other quantitative standards. The MAC is not seen as a standard to be checked in everyday practice by actors involved in implementation, but as a standard serving as an assistance in preventative measures. The MAC does satisfy to this purpose, certainly in the industrial sector.

In the agricultural sector, exposure to health hazardous chemicals appears not to be fully prevented. Users are not always willing to carry out the required measures. Actors involved in the establishment, as well as controlling agencies in implementation explain this by ignorance on part of the user. The difficult methods of usage of some protective measures also play a role. Moreover, the rationality of the user -- the risk perception of the user -- is not taken into account. The question is whether or not it is possible to set a universal standard applicable to every situation. The complexity of every new situation with regard to the use of a standard, and the indeterminate nature of knowledge, seem to make it impossible to devise a standard that covers every situation. At this moment, the solution to this problem is not sought in the standard-setting procedure itself, but in solutions such as providing information to the workers or in legal instruments such as allowing only educated workers to use certain equipment and chemicals. The Procedure itself has characteristics which occur higher on the ladder of Citizens Participation as mentioned in the field of Risk Communication (Hance et al, 1990, 33), such as Consult 2 -- which means that the Government asks citizens for meaningful input and intends to listen. Solutions of problems that occur because of the indeterminacy and conditionality of knowledge are found in less interactive steps of this Ladder, such as `Informing', which means that the Government talks, and the citizens have to listen.

The Three-Part Procedure seems to incorporate partial reflexivity and partial interaction. Therefore, it is not an example of an extended form of social learning as mentioned by Wynne. The question rises as to why does the Procedure not involve even more actors, and probably find a solution to the problem of the conditionality and indeterminacy of knowledge? One of the answers is that indeterminacy of knowledge will always occur: a situation in which the standard and associated measures would not be of use, or impossible to use, because of constraints of the context of application is not only thinkable, but also probable. However, the extent of indeterminacy can be reduced, by anticipating situations of application as much as possible. Another point is that standard-setting for a chemical as it is currently fulfilled, can take several years to be completed. Barriers within the procedure guarantee closing of an otherwise

endless debate. Involving more actors in the procedure may result in a less efficient and effective procedure.

Concluding remarks

The establishment of MACs by means of the Three-Part Procedure could be a step in the direction Wynne has pointed out, in which the final standard results from a long and complex process of negotiation between (scientific) experts, future users of the standard and policy makers. Some features of interaction are satisfied, such as the involvement of local knowledge. Scientific and other knowledge, taking serious account of rationalities other than those of experts and a diversity of rationalities are present in the process. Reflexivity occurs within the Expert Committee as well as within the MAC Commission by means of the constant evaluation and adjustment of the own procedures. However, this takes place on the level of the institutions themselves, not on the level of the entire Three-Part Procedure, and scarcely or not at all towards or in association with actors outside these institutions. To a lesser extent the feature of frankness is satisfied: not all parts of the Procedure are accessible to laymen, and negotiation mainly takes place within the commissions, the communication with actors outside the commissions does not have the nature of a negotiation. In this case, one might speak of partial reflexivity, and partial interaction; partial reflexivity because not all protocols and procedures are subject to scrutiny, and partial interaction because not all involved parties have the same opportunities to influence the method, content and outcome of the standard-setting process. The type of social learning involved here is *internal institutional learning*. Not just because it are the institutions that are learning, they certainly do, but mainly because they are learning mostly from their own perspective and experience, and to a lesser extent, the perspective and experience of others.

When the standards and associated measures are applied in practice, it appears that it is not possible to take into account all situational factors and the rationalities of all possible users of a standard. Indeterminacy of knowledge does occur, and although a large social acceptation of a standard is generated during the standard-setting process, this does not mean the standard and associated measures will be used in every situation in the intended way. Perhaps a more extended form of social learning would improve the results of the procedure. However, this could also diminish the efficiency of the procedure. During the Three-Part Procedure, a balance between efficiency and social learning is sought, in which the advantages of involving non-experts outweigh the disadvantages.

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9. Science Shops, Accessible and Affordable Academic Research on Behalf of NGOs

Maureen E. Butter[1]

In the early seventies the phenomenon of Science Shops emerged in the Netherlands in an atmosphere of social and educational reform. They were explicitly meant to support groups and organisations in their pursuit of social justice. Science shops are university-bound service centres that take on research assignments for free. Students as a part of their curriculum then carry out research, under supervision of regular staff. The students get the credits and relevant experience, the group gets the results, to use as they see fit. The concept rapidly spread through the Netherlands, but it took about a decade before it was copied in some other Western European countries. At present, there is growing international interest to promote science shops as an instrument to strengthen public participation in decision-making. This paper gives a brief outline of origin and development of the science shops in the Netherlands, their possibilities and limitations, and recent initiatives to export the idea to Eastern Europe.

Origin and development

Science shop is a literal, though unsatisfactory translation of the Dutch term 'wetenschapswinkel', which in itself is an unfortunate word, because it suggests selling and buying. Besides, the term 'science' in American parlance denotes the natural sciences, while 'wetenschap' means academic research in a broader sense. Yet the term 'science shops' has become established, just like 'wetenschapswinkel' in its country of origin. Science Shops were founded in the late seventies, in a climate rife with social criticism challenging the traditional order. Throughout the western world there was anti-war, anti-imperialist, second wave feminist, environmental and radical leftist activism, especially among students. Part of the criticism was internally directed: university culture was accused of being elitist and authoritarian. The academic ideal of value-free research was challenged, by default such research could only serve vested interests. Staff members of the universities supported many of these ideas. The curricula had to change anyway, to adapt to the rapid increase in students, caused by both the babyboom generation and rising educational standards.

Educational innovation preceded the establishment of the first official science shops, but in reality the distinction blurs, since some educational reforms actually *were* science shops. Value-free research was out, since it had produced nuclear weapons, colonialism and environmental pollution. Instead, universities were to adopt socially engaged science, directed at solutions of the problems the world was facing (Anonymous, 1980). In the natural sciences this educational innovation led to the establishment of 'Science and Society' departments in most universities from 1974 (Anonymous, 1980), which still exist in some form as a respected subdisciplines. The new education took the form of student **projects**, real life problems reflecting social needs, to be investigated by a co-operating group of students in dialogue with and on behalf of stakeholders from outside the university (Anonymus, 1980, Weerdenburg, 1987).

Student volunteers in Amsterdam in the early seventies had started to give free advice to citizens' committees, the so-called 'rechtswinkels' ('law shops'). The first, unofficial science shops were also student initiatives following to the 'rechtswinkel' model. Jan Weerdenburg, in his review at the occasion of the 10 years anniversary of the science shops, takes 1977, and the establishment of the first official central science shop for the whole university, as the 'true' beginning of the science shops (Weerdenburg, 1987). In 1987, such an accomplishment seemed to be more weighty than the departmental science shops, situated at and integrated with, a disciplinary group, such as architecture, chemistry or biology. One year before, there was already a chemistry shop in operation

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at the same university. In Eindhoven science shop-like groups worked at different departments as early as 1974.The department of chemistry at the university of Utrecht, however, had been organising students' projects about citizens' problems from 1970-76 (Anonymous, 1980).

Most preparatory groups in other universities date from 1977-79 (Anonymous, 1980, Weerdenburg et al, 1983). Science shops in all university cities rapidly followed, often in continuation of existing departmental student volunteers' science shops, but also on initiative of the university boards. In the beginning science shops were very democratically organised and primarily run by student volunteers. The university just employed a part-time 'co-ordinator' to facilitate and support the volunteers. A typical science shop had a council, or assembly, composed of students, research staff and NGO delegates with strong administrative competence (Anonymous, 1980, Weerdenburg et al., 1983).

From the beginning, the mission of the science shops was threefold. Apart from providing access to academic research to non-dominant groups without finance, the idea was to reform education, making it more relevant to societal problems. And the third, most daring mission, was to reform academic research itself, making it more critical and emancipatory (Anonymous, 1980). A lot of energy and debate was devoted to procedures and criteria for accepting assignments. Practically all science shops were devoted to pursue 'redistribution of power, wealth and know-how' by supporting emancipatory groups, provided that they met the criteria, some of which are given in Table 1.

Table 1. Criteria to the 'client'

Group or organisation	The science shop should not work for individuals
Lack of funding	The science shop works only for groups or organisation who really cannot pay
No commercial goal	The request is refused if it serves income generating interests
Implementation perspective	The group should be able to take action with the results of the research
Educational value	'Encyclopedic' questions that do not require 'true' research, are not considered proper science shop assignments
Publication and independence	The science shop and the student's supervisor direct the research and publish the results as they see fit

Nowadays, none of these criteria strictly holds anymore. In practice many questions do not meet the educational criteria. Yet, the science shop tries to help such a client as best as possible, either by providing the requested information or by referring to another institution. Also it was realised, that one individual sometimes is able to exert profound influence, or that individuals may raise issues which are of interest to larger groups. Most science shops apply criteria to the question, rather than to the client. Some science shops charge a fee for formerly free services and commercial goals are no longer viewed with suspicion. Research projects may be carried out in co-operation with the client. But most of all, the science shops have changed from participatory volunteers organisations with strong social commitments to professional departments to their university with diverse scopes and practices, depending on the local situation (Weerdenburg and Pennings, 1991, CWW, 1994).

The first two objectives, access for underlying groups and reforming educational programs, have been reasonably successful. A problem is, that it may take some time, before research can start, since the science shops themselves are but small units and they have to wait till a student wants to take up the question. The third objective, transforming university research programs into more community-oriented direction, is hard to evaluate. Research programs in general do not mention the science shops. They are but small units, not engaged in fundamental research, but that doesn't preclude influence.

Research for Empowerment

Currently, there are thirty-three active Science Shops in the Netherlands within eleven Dutch universities. From the beginning, a substantial part of the science shops' effort was directed to the region and the problems of local groups. From the beginning, major research domains for the science shops have been environment, occupational health, and social justice, including labour, gender and minority problems. In the early eighties, many toxic waste dumps were exposed and local authorities

unmasked, involved as they were in the cover up of what nowadays is regarded as environmental crime. (Weerdenbur and Pennings, 1991) Results have been used in conflicts (lawsuits, publicity campaigns), but also for other purposes, for example advices to inhabitants for reducing noise and dampness nuisance indoors (Science shops Physics in Utrecht and Groningen, Science Shops of the technical universities in Delft, Eindhoven and Enschede). Colleagues from the Science Shop for Medicines in Groningen developed cheap formulas with local ingredients for common medicines to be used in tropical countries. The client was a medical organisation engaged in development aid. Such research was uncommon during the eighties, but nowadays many universities engage in applied research into acknowledged problems for which they can raise external funding. Also many competing first line advisers have been established, such as environment telephone service, and environmental consultancy agencies.

The environmental movement institutionalised, as did the women's movement and many other former customers (CWW, 1994, Hijman, 1987). The focus of interest of the science shops partly redirected towards more in-depth studies (on request of the environment telephone for instance!) and pioneering preliminaries of emerging issues. One example of the latter: The Economy Shop in Groningen developed a checklist for social responsibility of companies. With this tool they analysed the annual reports of the 25 largest companies in the Netherlands and scored them for their performance in the fields of for example environment and human rights (Heine and Maatman, 1998).

However, a substantial part of the questions addressed to the science shops still comes from local groups and ephemeral, issue-oriented citizens' committees. A lot of questions from such groups have to do with health and environment. In twenty years, science shops have been publishing more than a thousand reports on environmental and occupational health risks. Many references cited in the Manual for Indoors Environment, as well as the Manual for Outdoors Environment, in use by the Municipal Public Health Services, are reports from various science shops (Slob et al., 1996, resp. Van Bruggen and Coenen et al., 1996).

Science Shops in Rumania

In Western Europe, science shops have been emerging from local initiatives. There have been contacts and visits, as well as exchange of information with science shops in the Netherlands. Essentially though, these groups managed to get a science shop started on their own, adapting the Dutch model to their own situation. Recently, there have been some initiatives to promote science shops in Eastern Europe, with subsidies and guidance from the Netherlands, in order to get started.

At present the Science Shop for Biology and the Chemistry Shop in Groningen are involved in a project to establish four environmental science shops in Rumania. They co-operate with the four universities involved, and with Arie Fokkink of Green Grid. Fokkink, former staff member of the Chemistry Shop in Utrecht. has been involved in an earlier project of the Chemistry Shop in Utrecht and the university of Brno, Czech Republik, to establish a science shop in Brno. A substantial problem in Brno was the language. Another the integration of science shop activities with the regular curriculum and unwillingness of the university to fully co-operate. The Brno science shop is situated in an environmental centre, and operates more or less isolated from the university.

In several respects the Rumanian project differs from Brno. A lot of information has been translated into the Rumanian language and one of the project participants is fluent in both Rumanian and Dutch. A lot of attention is being devoted to embedding the newly established science shop in the universities involved. The departments involved are very willing to co-operate, although they are not used to the idea of 'student's projects', for which they, eventually, will have to develop their own form.

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10. Self-assessment of Health and Environment, Fast, Cheap and Empowering

Maureen E. Butter and Thea van der Wal[1]

During the NGO preparatory conference 31 january - 1 february 1999, Soesterberg, Netherlands for the Third Ministerial Conference on Health and Environment, the Monitoring Network for Health and Environment organised a workshop 'Empowerment of Citizens'.
Participating NGOs exchanged information about communicating with public authorities on environment and health matters in situations, where environmental problems affect public health. A common experience is that unless the relation between their health and the environment is very obvious, citizens have a hard time to get their message through.

The weak position of citizens

The position of citizens is inherently weak, both because they are unorganised and because public authorities have to reconcile conflicting demands of public health and environment on the one hand and economic opportunities and employment on the other hand. On the local level, politicians often wear more then one cap. In one case, the mayor even owned the waste incinerator and imported huge amounts of foreign waste, much to the detriment of public health of his citizens.

From every part in Europe, NGOs report severe health problems in the vicinity of waste incinerators and landfills [2]. And, as appears, it is a very persistent problem, also in countries with advanced environmental and health standards. Action groups in Netherlands and Belgium around waste incinerators have been fighting them already more than 10 years, and they are still operating. Waste incineration can serve as an example of a local source, affecting a limited number of people. We should bear in mind however, that there are numerous local sources even smaller than waste plants, and that victims of these have an even more difficult problem to find evidence and to state their case. Because average emissions are below the standard and because average health is not alarming, their problem is not recognised and not acknowledged.

Even if more detailed data exist, citizens' groups have no access to them: health data are withheld with the argument that privacy has to be protected. Detailed, small-scale environmental data are often private property. Permits usually don't take peek emissions into account, and information about peeks is not available.

Citizens from Weurt in Netherlands and Sint Niklaas in Belgium described their severe health problems. Cancers, death of children, miscarriages and malformations abound, yet authorities fail to improve on the situation. At first, they take on an appeasing attitude: no danger to public health, and when finally convinced, they seem to lack the power to achieve real changes. These groups have been struggling for many years and definitely achieved much, but the problem as such still stands. New forms of co-operation have been initiated.

NGOs from Eastern and Central Europe affirm that citizens of their country have to cope with similar and worse problems, both with the environment and health situation and with unwilling or downright corrupt authorities. They are interested in the methods of the Monitoring Network, which are cheap to apply: local volunteers can register the problems on form, and send them to a central database manager. But they are univocal about the need to implement such a system within the framework of an international network, not only for technical and financial assistance, but also from an empowerment perspective.

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[2] Arne Schoevers, Waste ans Environment Foundation, pers. comm. Soesterberg, 1999.

Most NGO participants in this workshop are very interested in international co-operation on empowerment of citizens and small, local groups. Networks could be sustained by well-motivated groups around waste incinerators and dumps, local environmental and women's' NGOs, schools, local health officials, etc, supported by a superstructure of larger NGOs for fund raising, international political action and database management.

Self- assessment as a tool for empowerment

The Monitoring Network for Health and Environment is a Dutch NGO with five years experience with self-assessment by citizens and central registration of environment-related health problems. Central registration helps a great deal to empower isolated individuals and local groups. Cornerstone of the system is an utmost care in communicating with patients, respecting them and protecting their privacy, as well as meticulously and systematically registration of symptoms as well as relevant background information and environmental circumstances [3]. Inspiring trust and being trustworthy is one of the main concerns of the Monitoring Network and of other NGOs aiming at empowering people. An intermediary role is accomplished by being a citizens for citizens organisation on the one hand, and by expert support on the other hand.

The Monitoring Network has become a highly respected NGO, although still facing epidemiological prejudices. Another frequently encountered problem is the medical fear of causing hypochondria by communicating about environment-related diseases. And a third is the expert versus laymen arrogance still abounding in so called public information.

Self-assessment by citizens is one of the best available methods

Epidemiological proof requires large numbers of victims, and a distinguishable set of symptoms, to be related to known levels of exposure, preferably of a limited number of agents. It is a coarse grain method, unfit for local sources and small samples.

Citizens, on the other hand, are experts in their own right on the relation between the environment and their health. Usually they will have some clues. They may experience direct nuisance. They see, hear and smell what's happening in their vicinity. They have their own networks for information. They may know about similar cases or about health effects to animals and plants. Epidemiological methods are slow in comparison and require very large numbers of people in large areas, over long periods of time, and preferably exposed to identifiable agents. Self-assessment is also very cheap, provided that a low threshold accessible platform is available, that registers both health and environmental problems in a systematic way.

Reluctance to acknowledge the problem

The opportunity for registry, even if it is encouraged by media attention and supposed hypochondria, does not lead to an avalanche of hard to diagnose complaints. On the contrary, people are reluctant to pursue the matter, despite often severe health problems, because there are many disincentives to discourage such a course of action.

People don’t want to be a bore or a threat to their neighbours and to officials. They don’t want to face hostility, especially when they already feel uncertain. They are afraid to mention their suspicions because the consequences can be unpleasant. They might have to move, or lose their job, or see the value of their house go down. In some cases they are intimidated, or even physically assaulted. They may feel responsible or even guilty about the disease of their child or partner. People maybe too sick or too miserable to bother to telephone. They may be depressed and think it does not help anyway.
Inspiring trust, being accessible, available and supportive is imperative for any organisation involved with data registration.

Conflicts of interest and communication problems

There are often conflicts of interest between local authorities and individuals with problems. Fear of financial consequences and loss of economic opportunities because of regulative measures may impede their willingness to act. Health officials may want to prevent undue panic. Those responsible for

[3] Maureen E. Butter, A National Monitoring Network for Health and Environment: Ingredients for Success. 1999.

environmental quality are not likely to take action on mere suspicion of individuals. Especially when the responses to environmental stress take multiple forms, which is often the case, they will have a problem justifying action. Denying the problem, or blaming the victim ('if it isn't our fault, it must be yours') often follows.

To keep the trust of a community, citizens' communications should taken seriously and respectfully. After all, they know the kind of impediments and health complaints they or their relatives suffer and they are eyewitness to what happens around the factories and plants. Reports that don't mention the problems the citizens experience, that don't acknowledge their worries and emotions, carry a strong semblance of not addressing their problems and therefore don't seem trustworthy

The best way for public authorities to quickly regain the people's trust is to take measures: close down a factory, refuse a permit, or impose a fine. If the government appears powerless to act, even the most respectful communication won't inspire any trust. Separating responsibilities by leaving civil action to civil organisations prevents distrust and helps to empower citizens

Data, research and second opinions

Most NGOs provide services, such as expert advice or mediating between citizens and other parties. A major task is the collection, verification and evaluation of relevant data. Access to data is problematic in many ways. People want to know to what agents they and their children are exposed, and what the risks are. If they are experiencing health problems, a simple reassurance will not satisfy their needs. Too often, public authorities downplay their complaints on obviously superficial grounds.

Risk assessment is often based on theoretical emissions, listed in environmental permits or on measurements of substances, which are expected to be there. Besides, measurements are not always taken on the right spots, places and in the right circumstances. Theoretical health risks are often based on scanty evidence. Nobody really knows much about effects of combinations of environmental stress factors. In addition, there is not enough attention for the effects of accumulation and long-term exposure.

Moreover, the environmental quality can be worse than expected. Permits may be old or non-existing, incomplete and generally inadequate, and control on implementation lacking or insufficient. Illegal emissions, previous events, mistakes in the working-process, unreported accidents and so on are not taken into account.

If children's safety is at stake, mothers are often the first to take action. Parents, who carry the actual responsibility of caring for and protecting the young and the diseased, are also the most alert to dangers, whether from air pollution, traffic or unsafe food or water.

Health can also be worse than expected. Health data are not systematically registered, let alone related to environmental exposure. Only in few cases, the relation between health and environment is immediately obvious, for example in case of a nuclear disaster. This is unlike nuisance, for instance smell or noise, where the relation to environment can be taken for granted. Health damage most often occurs after a certain period, sometimes even quite a long time, of exposure. Usually the problems are complex and difficult to relate to the environment. To picture the real health situation, all kinds of data should be used: hospital admittance, local physicians' administration, school and work absenteeism, midwife- dispensary and veterinary administration, plant life and environmental situation, demographic information and so on.

In the Netherlands, universities have established 'science shops', in order to make academic research facilities available to groups without money. Students, under expert supervision and as a part of their curriculum carry out the research. It has been proved an important tool to empower citizens and small NGOs. Much information about soil pollution in residential areas, suspected health effects of certain pollutants, critical reviews of standards, counterchecks of official reports, assessment of indoors environmental quality and a wealth of other issues has reached officials by the work of the science shops.

Solving the problem

Research, demonstrating that the problem is real, is but a first step. Even with scientific proof it may take a very long time to convince the local authorities. But even acknowledgement of the problems in parliament doesn't cure the situation. After convincing responsible authorities, it may take a long time for them to act. If the legal framework and the willingness to implement the law are sufficient, lawsuits may delay improvements for many years. Often either the law or the administrative organisation is inadequate

to achieve change. A frequent source of delay is further research. But concerned citizens often know more than government officials and politicians. They are better motivated and they really want to change the situation. When given the chance, they offer practical and creative solutions because they know the circumstances. Sometimes direct contact with companies is more rewarding than trying to convince authorities. They too are interested in results, not reports.

Conclusions

- Health problems of citizens due to environmental pollution are to a large extent ignored. This is due to inadequacies in risk assessments, inadequate administration, precedence of vested interests and reluctance on the part of the citizens themselves to acknowledge the problems
- Citizens with health problems often have to wait very long for actual improvements, even if their problems are acknowledged
- Communication between any party concerned need always be two-ways and respectful.
- Self-assessment of environment related health complaints is valuable, because it is one of the few inclusive indicators of environmental quality. It is important for health and environment authorities to take the signals of citizens seriously, in particularly concerns of mothers and fathers about their children's health
- Self-assessment can correct faulty risk evaluations, identify new problems and indicators, reveal hitherto unknown environmental contamination and mobilise citizens' problem-solving capacity
- Health and environment status should be assessed before as well as after decision-making and results should be accessible to the public.
- Citizens need access to research facilities and second opinion to substantiate their problem
- Support networks of local groups, national and international NGOs are important tools for awareness-raising, problem-solving and adjusting political and legal frameworks

Participants Workshop Empowerment of Citizens

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11. A National Monitoring Network for Health and Environment: Ingredients for Success

Maureen E. Butter[1]

The Monitoring Network for Health and Environment is a Dutch NGO, which registers environmentally related health complaints. Both health complaints and environmental circumstances are coded and saved in a national database. Researchers and institutes can use these data for further research. The data provide signals demonstrating people's perception of environmental pollution.

In addition, these data can help to gain insight in complex interactions between health and environment, relationships, which are always disputed and almost impossible to validate. The more signals from different sources point in the same direction, the more readily such issues will be generally accepted. Similar complaints from independent parties, for instance health problems related to low frequency noise, waste incineration, high voltage lines etc, in general will help citizens to request further research or appropriate measures.

There is growing international interest in the Monitoring Network and the possibility to introduce a similar system elsewhere. In this paper I will give some background information about the organisation and its requirements as it works in the Netherlands. I will discuss briefly possibilities and problems to introduce the system in other countries.

1. Human resources

The Monitoring Network in the Netherlands is volunteers' organisation. Thanks to a wonderful human resource manager, José Höppener, some 20-30 people spend a lot of time and effort to keep the Network going. Eleven so-called station managers, who take care of a specific region form the core of the organisation. They work from the home, with a telephone as minimal equipment. Less than half of them have a more than average background on environment or health. What they all do have in common, is the capacity to listen, without judgement, to the applicants' stories and a willingness to help.

For registry a questionnaire is used, which is filled in by the applicants themselves and posted to the regional station. In case of incomplete or incorrect forms, the station manager has to call back in order to retrieve the missing information. Most station managers enter the information in an electronic regional database and submit the mutations to the central database manager. Some not too computer-wise managers leave that part to a colleague, preferably in a nearby region.

The station manager also supports the citizens, sometimes by referring them to public health authorities or other institutions, sometimes by mediating between parties on their behalf, or by providing information. Even if they don't know the answers, they know where to find people and institutions who can find them. Individuals are encouraged to form groups, either at the local level, or at a national or even international level.

The most successful station managers also sustain networks of environmental NGOs, public health organisations, municipal authorities, journalists and general physicians. Some station managers have installed substations, either working from the home, or from an NGO-office with related interest. Thus far, station managers meet regularly (once a month) to discuss what's going on. New managers have to be trained in the use of computers and software and once a year a 'computer-day' is organised for all

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station managers.

Apart from the station managers, there are volunteers taking care of publicity, the website, advice on environment, on health and legal aspects.

2. Equipment, system and software

As stated above, minimal requirements are a telephone and a set of forms. Theoretically one could do with a postal address, but that will be a disincentive. An answering machine or voice mail is an asset and a pc is desirable. Since people have to know where to apply, flyers or other information material will be needed.

By filling out a form, people can acquiesce in co-operating with future researchers. The forms and their names and addresses are kept by the local station manager, who is the only one who can get back to them. The form also enables a very systematic and rigid registration of both health problems and environmental circumstances.

The classification system assigns codes to both health and environmental circumstances. The health classification is based on the ICPC International Classification of Primary Care, adapted and tested in practice by the station managers. The environmental classification is designed by Maria Verheuvel, M.Sc. (see appendix). The central database manager, Dr. Paul Höppener, general physician, remarks that the station managers have a tendency towards overly detailing the classification system, with the result that he has to cluster the output again, in order to obtain decent graphs[2].

The software is an Ms-Access application, minimal requirements Windows 3.1, a 486 processor and about 100 Mb hard disk. The output anonymises the data, but allows for geographical representation, because significant digits in (geographically based) postal codes are kept. Specific entries can always be traced back to the source entry, which is kept by the regional manager. The system corrects double-counts.

3. Financial resources

Even though costs are kept low, they have to be covered. Some people are paid, others, but not all of them, would want to be paid if resources were available. Up till now, the funding has been provided mainly by the Ministry of Environment, Housing and Spatial Ordering, on a temporary basis. Fund raising in order to guarantee continuity is the major challenge the organisation faces today.

4. Establishing new Monitoring Networks across the border

Can the concept of a national monitoring network be exported and extended to an international network? That depends. First of all, it should be clear, which organisation will take up the responsibility to set up and maintain a national database. The system is of little or no use for regional applications. In the Netherlands the network is supported by a team of dedicated volunteers, who meet monthly. Such an organisation is impractical if not impossible in countries where for one or other reason

- there are too few volunteers (a problem the Netherlands also encounter, since fewer and fewer people have enough time for unpaid work)
- the country is too large for regular meetings

Professionals, working from a central office, or stationed at regional working NGO-offices could do the job, as long as they manage to stick to a consistent system of classification and registration and as long as privacy of applicants is adequately protected. Registration by public health officials could be a possibility, but they might have to cope with distrust from the part of citizens, which often feel that they are not taken seriously. As long as the executive office doesn't have to accommodate the public in case of environmental incidents and either or not justifiable fears, such problems can be avoided.

[2] Paul Höppener, personal communication, April 1999

Equipment could be a problem, especially in poor countries. In such cases, the local managers could make use of forms with a separate leaf for private data and submit anonymised forms to a central database manager. The system could be less detailed to facilitate filling out forms and entering the results in the database, but some form of personal contact is necessary. The applicant needs reassurance that the often emotionally charged and sensitive information is treated with care and consideration.

Extending the national networks to international networks would require either international database management, or a standardised output on the internet. It is a tempting thought to use the electronic highway for registration purposes as well, but I don't think it feasible. First, for privacy reasons, second to avoid nonsense registrations and double-counts, third to be available and accessible for all citizens, not just internetters.

MONITORING NETWORK Address monitoring station

HEALTH AND ENVIRONMENT

REGISTRATION FORM

GENERAL INFORMATION.

DATE :.....

How did you come to know about the monitoring network ? : .....

1. PERSON WITH HEALTH COMPLAINT(S)

Surname : ..... Initials : .....

Street/House No. : .....

Postal Code : ..... since : .....

City / Town : ..... since : .....

Telephone No. : .....

Date of Birth : .....

Male/ Female : .....

#Are we allowed to call back? yes/no

#Has the complaint been reported by the above mentioned person him/herself ? yes/no

Question number 2 to be filled out only when answered with 'no'.

2. INFORMANT Complaint(s) of above-mentioned person reported by :

Surname : .....

Street/ House No. : .....

Post Code /City : .....

Telephone No. : .....

Relationship with the above-mentioned person: .....

#Is it OK to call the above-mentioned person? yes/no/don't know

3. HEALTH COMPLAINT(S) possibly/probably related to/ caused by environmental factors:

Description : .....

.....

.....

#personal perception of complaint : serious/moderate/slight

- complaint has existed since : .....

#presence of complaint : continuously/ long periods/short periods

#complaint influenced by : weather/holidays/season/other .....

#info previously given to : regional health officer/environmental org./

science shop university/other.....

#previous consultations : family doctor/specialist/alternative/other..... #presumed environmental influence : strong/moderate/slight

Why do you assume that the above-mentioned health complaints are related to, or caused by environmental factors? .....

.....

.....

Which illnesses or health complaints were already present before the above-mentioned complaints? .....

.....

.....

.....

4. ENVIRONMENTAL FACTOR(S)

Description .....

.....

.....

.....

5. ADDITIONAL INFORMATION

- In which city/town the person with complaints lived previously ? .....

WAY OF LIFE

With regard to exposure to chemicals etc.:

- Which professions did the person with complaints practise successively ? .....

.....

-What is his/her current profession ? .....

- How is his/her free time spent ? .....

.....

Does the person with complaints smoke ? Yes/no/don't know

- Has he/she ever stopped smoking ? If so, when ? .....

Is he/she hindered by other people's smoking ? Yes/no/don't know

THE HOUSE

- When was the present house built ? .....

Has the house been renovated ? Yes/no/don't known

If so, what was done and when ? .....

.....

Is the house damp ? Yes/no/don't know

Is there any visible mould ? Yes/no/unknown

# Is there sometimes water in the cellar or crawel space ?	Yes/no/don'know/n.a.
# Is there a mechanical ventilation system in the house ?	Yes/no
If so, is he/she satisfied with this?	Yes/no
# Has there any materials been used in the house which could cause health problems ?	Yes/no/don't know

PLANTS AND ANIMALS

-Are there any special health complaints to be noted concerning plants or animals ?

.....

12. Sustainable Development and Women's Health

Maureen E. Butter, PhD[1]

Current notions of sustainable development in the Netherlands are confined to physical regulation of the environment, incorporating a social perspective only insofar as it serves to enforce physical targets. Environmental policy is conceived as a gender-neutral issue, equally affecting men, women and children. Women's unpaid work at home is barely considered. So measures to restrict automobile traffic, for example, add to already overburdened schedules of mothers who have to take children to school, to care for their family and for elderly relatives, as well as to comply with job responsibilities.
While the environmental movement keeps its indifference towards women, an increasing number of women's organizations are taking on the environment, making development sustainable for women too. The women's movement has begun to pose some important questions: Whose common future are we talking about? What values will replace unsustainable consumption, as long as the value of unpaid responsibilities and services carried by women is consistently overlooked in economic and environmental policies?
Reproductive health is in danger, both from environmental and social causes. The omnipresence of diffuse pollutants is a hard to control threat to public health. It is suspect as a contributing cause to many types of cancer related to the reproductive system, and has been proved to cause subtle abnormalities in about 10% of the newborns. But social processes, culminating in postponed motherhood, as well as growing gaps in accessibility of health services all affect health and reproductive health, with different impacts according to age, gender, income, and ethnicity.

1 Introduction

In 1994 an NGO task group 'Population and Development: post Cairo' was formed by the NCDO, the National Committee for International cooperation and sustainable development. The purpose of the task group was to follow the implementation of the ICPD Programme of Action and to stimulate public debate in the Netherlands about the issues on population and development. The latter was achieved by preparing expert discussion papers on several issues pertaining to the ICPD and organizing public debates with NGO's and representatives of public authorities and service centers around these papers.

Regrettably, the participation of environmental organizations in the task group was minimal. Neither health nor women's issues figure prominently on the priority list of the national environmentalists. Social differences like race, class and gender links to environmental quality, risk and behavior are virtually non-issues in environmental policy as well in the environmental NGO-programs. Women's organizations, on the other hand, show a growing concern for environmental matters. One interesting development is the evaluation of environmental plans by means of an Emancipation Effect Assessment. This far, three Emancipation Effect Assessments have been published: one about green taxation and two about physical planning (13, 28, 29).

In addition to the reports of the NGO task group, the author consulted as many NGO's and public representatives with activities touching upon the ICPD-issues as possible. Also background information in the form of articles, policy documents, press releases and scientific publications was collected in order to chart the environmental links. The author is indebted to a great many informants and trusts that this report gives a fairly good impression of what is going on in the Netherlands.

[1] Main paper in: Maureen E. Butter, Sustainable Development and Women's Health. Implementation of the Cairo ICPD Programme of Action in the Netherlands. NGO Country Report for Cairo+5. WECF/ The Science Shop for Biology, Groningen 1999

2 Macro-economic links to women's health

Due to an ever-increasing demand for health services, the tendency is, to establish market mechanisms and to privatize as many public services as possible. This is, however but a small part of a general picture of a retreating government, cutting back on expenses. The results of this ongoing restructuring process are sometimes unsatisfactory in terms of equity in general and equity in public health specifically.

- The poor face increasing financial thresholds to health care (21). Up to 40% of the elderly, most of them women, suffer a substantial decline in purchasing power over the last fifteen years, primarily as a result from government policy (43). Eighty percent of the home care centers have introduced priority lists and limited access to care (12).
- Cuts in expenditure on women's health organizations endanger the effort to cure structural inequalities: 'mainstreaming' to a certain extent becomes a synonym for 'cut back' (pers. comm. Ellen Verheul, WEMOS & Platform Women and Health). In order to prevent female circumcision among new immigrants from Somalia, a low budget network of established Somalians was formed to provide social support to the newly arrived. This proved to be very effective in many respects. But the project had to be discontinued by lack of structural finance (pers. comm. Alem Desta, VON, Netherlands Refugee Organisations, information confirmed by Gerda Nienhuis from Pharos).
- There are substantial differences in health as well as reproductive health, which are related to social economic position (26,35). Paramount are the differences between non-whites and whites, for instance in infant, child and maternal mortality (2,3). For a part the latter are due to events previous to immigration, unhealthy lifestyles and under-utilization of available health services, but the quality of residential environment exert an influence as well (2, 26, 35).
- Reproductive health services and contraception in the Netherlands, on the other hand, are widely available, resulting in very low abortion and teenage pregnancy rates. Perinatal care and child health care in the Netherlands are of a very high quality and accessible to all but the unregistered immigrants. The latter are entitled to mere medical emergency (2, 3).
- Chlamydia is the number one STD in the Netherlands. Many carriers of the infection are not aware of it. In women it can cause inflammation of the fallopian tubes, resulting in diminished fertility. NGO's engage in new partnerships with companies in order to promote the use of condoms by adolescents, a group at risk because of multiple sexual encounters (21). But most women use the pill for anticonception, as it is taken for granted that this is the most reliable method to prevent pregnancy. There is reason to doubt if this is a free and well-informed choice. Most physicians routinely prescribe the pill, which is reimbursed by the insurance. Condoms are not reimbursed and thus pose a financial barrier to adolescents (18, 19, 36).

Cross connections between economic order and health are numerous. Tight time schedules yield stress. Postponed motherhood is a result of educational and career demands constraining reproduction opportunities. While in itself perhaps not undesirable, it incurs a risk of unwanted infertility, either of the woman or the male. According to a patients' association for fertility problems, one out of six Dutch citizens will have to cope with one or other form of unintentional childlessness and up to 10% of the couples will remain so, despite fertility treatments (16).

3 Environmental links to women's health

The environment is not a gender-neutral issue, as it has different impacts on men, women and children. This applies both to environmental effects as well as to the consequences of environmental policy. Apart from health, major topics are the logistics of paid and unpaid responsibilities, employment and income, sustainable lifestyles and the quality of human relations (6, 7). It is the women's movement that poses the question *whose* common future we are talking about and *what* immaterial values are to replace unsustainable consumption, since unpaid work and responsibilities tend to be overlooked in all kinds of economic, spatial and environmental policies.

Sustainable development, for whom?

Environmental problems, difficult as they are, must not obscure the very serious structural problem of a general lack of awareness of gender issues in sustainable development. The chosen pathway to sustainability can gravely affect the life and position of women far beyond, say, the impact of green

taxation on single parent households and women over 65. Redistribution of unpaid work and child care services lag behind women's growing participation in paid labor, resulting in the well-known double burden. The indispensability and the logistic demands of unpaid activities like care and sustaining kin and family relations are underestimated as well as undervalued. Measures to restrict so called 'consumptive' traffic directly affect already overburdened time schedules of parents, children and grandchildren, supporting the current trend of substituting informal care for professional services (6, 7, 8).

> Traffic (pollution, congestion and safety) is a major problem in a heavily urbanized country like the Netherlands. All policies to reduce car use are designed to spare the holy cow of business traffic and to discourage private car use. All private car use, even if it involves informal care for and maintaining social contact with non-residential kin, is registered as 'social-recreational car use', a kind of environmental waste, which is to be taxed out of the market. The same counts for transport of children, to and from school, swimming pool, clubs etcetera, which are often just as necessary as business traffic (6).

Green taxation is a long-term operation, aiming at a transformation of a ‘commodity-oriented’ economy to a ‘service-oriented’ economy with supposedly positive employment effects for women. Actual proposals, however, are restricted to raising the consumer price of house fuel, electricity and gasoline. Taxes on house fuel and electricity will have a stronger impact on those, who spend most of their time at home, the sick, the unemployed, the elderly, the very young and their caregivers. (6, 28).
A second objection to green taxation in its present form may be that substitution of direct taxes on paid labor by indirect taxes on expenses, erodes the base of income redistribution between paid and unpaid labor. As long as gender equality has not been realized, this is a point of concern (8).

If sustainable development is to promote immaterial values over material ones, this is definitely the wrong course of action. A true policy of sustainable development should take the whole scale of human activities into account. The input of women's organizations for this process is indispensable.

Diffuse pollution, cancer and reproductive health

As for health and reproductive health, environmentalists are very concerned about xenoestrogens, by occupational exposition or at home, in food, water, soil and air (14, 23, 40, 46). Male infertility, cancer of male reproductive organs, as well as breast and cervical cancers are rising (16, 20, 23, 47). In a petition offered to the Dutch parliament by joint NGO's in November 1997, it is pointed out that since 1960:

- Children's cancer has doubled,
- Testis cancer has increased by 50%. This increase is particularly accentuated in men between 15-19 years of age
- Prostate cancer has suffered a three to fourfold increase, also in young men
- Breast cancer has doubled in all age groups and is now the main cause of mortality for women between 40-55 of age. One out of ten Dutch women will get breast cancer (47)

Although both sexes suffer, fertility problems bear heavier on women, since they often resort to invasive treatments like IVF as a response to both male and female fertility problems. But breastfeeding is also in danger, due to contamination of human milk with PCB's and dioxins. Even worse are the dangers of prenatal exposure to PCBs and dioxins. Exposure before and after birth has given rise to subtle abnormalities of approximately 10% of the newborns in the Netherlands, such as disturbed cognitive and delayed motor development (24). Age of the mother is an extra risk factor, since xenoestrogens accumulate in human tissues and are mobilized during pregnancy and breastfeeding (1, 12, 11, 20, 46). Levels of PCB's and dioxins in human milk are falling somewhat lately, due to a decline of these compounds in foodstuffs (25). But it should be kept in mind, that there are many other diffuse pollutants with similar effects as PCBs an dioxins, which are neither measured nor studied.

Occupational exposure

European law regulates occupational reproductive health hazards to the extent that pregnant women and men who intend to become father are entitled transfer to work not involving exposure to reprotoxic

substances. A man may consequently suffer social embarrassment, if he doesn't get his wife pregnant in due time (pers. comm. Dr. Anne Stijkel[2]). Other objections to these regulations are, that the list of reprotoxic substances is all too short (only few of the 100.000 substances have been screened for reprotoxicity) and neglect of the exposition prior in life (17, 41, 42, pers. comm. Anne Stijkel).

Home and the home environment

Home and the home environment have a greater impact on women, the very young, the elderly and the diseased. Regulations exist for the building of new houses and for building materials, but not for existing houses. Furniture and upholstery might be a source of toxic emissions, but there are no safety standards for this. Many houses suffer from dampness, due to overisolation to economize on the rising heating costs. This results in health risks due to allergens from moulds and house dust mites (39). Lead from waterworks in old urban quarters is harmful for babies on formula food. For decades infants have been exposed to dangerous concentrations in drinking water. Only recently (1997) the Health Council advised the government to lower the effective standard for lead in drinking water from 50 to 10 micrograms/l and to replace all lead piping as soon as possible (4).

Safety from traffic is a major concern. Although child mortality by road incidents has been steadily declining, this is not to be accredited to a safer environment. Not the street, but the parents have been changed, by heavily protecting their offspring, thus confining them to indoor environments. Not only has this adverse effects on motor and social development, but it contributes to an impersonal anonymous neighborhood, deprived of informal arrangements and social ties (37, 33, 45). In the country, children suffer from traffic hazards because automobilists tend to drive faster. Safe footpaths and bicycle routes to schools and other children's destinations are a long-standing wish of Dutch women's organizations (6, 45).

Persistent problems: air pollution and noise

The Monitoring Network for Health and Environment registers by far the most frequent health complaints in relation to air pollution and traffic noise (27). Air quality and noise affect a substantial part of the population (35, 32, 5). Although emissions of sulfur compounds have been markedly reduced since 1985, summer smog, due to traffic and agricultural emissions is still a substantial problem (9). According to the most recent environmental monitoring data (1997), air quality has ceased to improve at all, despite continuing effort in environmental policy (45). Recent research in the vicinity of Amsterdam Airport reveals serious nuisance or sleeping disorders among 18-31% of the inhabitants within a distance of 25 km. About 1.5 million adults live in that area, most of them outside the legally specified 'noise zone' (34). Nevertheless, the government allows expansion of the airport.

Food safety

Food in the Netherlands quite often exceeds the standards for nitrate and lead. Nitrate promotes stomach cancers and can cause the 'blue baby' syndrom and lead is a reprotoxic substance too, as well as dangerous to child development (10). Cadmium in food may contribute to osteoporosis (brittle bones, an aging disease which particularly strikes women after menopause) (22). Gradually increasing cadmium content of food in the Netherlands is a problem, due to widespread diffuse contamination of agricultural soils from fertilizers and air pollution. Although immissions have been reduced since 1985, there is still a yearly net increment (9, 33). Cadmium, unlike other heavy metals, is taken up readily by plants and food is a major source of cadmium exposition, apart from smoking and air pollution. Smoking, diets high in fibers or shellfish, environmental or occupational exposition and iron deficits are risk factors that may easily result in transgression of safety limits (10, 22). In a Swedish review of cadmium exposure, it was found that women in general show higher cadmium content in their tissues. It was postulated that this was because women more often suffer iron deficit, which promotes cadmium absorption in the body (22).

4 Best practices and major constraints

As was stated before, the major constraints are the limited conception of 'sustainable development' by environmentalists and environmental policymakers. The prevailing mentality, that 'a women's issue is a

[2] Dr. Anne Stijkel is one of the leading experts in occupational risks from reprotoxic substances. She is advisory member to the Nationan Health Council of the Netherlands.

women's affaire' is of no help either. Of the numerous examples of 'best practices' offered by informants, only two are highlighted in this report.

Children reclaim the street

The foundation 'Kinderen Voorrang! (Right of Way for Kids!) alarmed by a research report from Zürich about the interconnections between child development and children's opportunity to play outdoors engendered a project to reclaim the public space for children's playing ground. First they took stock of all research projects in the Netherlands into the role of outside playing for the physical, emotional and social development of children. At the same time they initiated research into outside playing in several Dutch municipalities. The results proved to be an eye-opener, both to researchers and policymakers: playing outside without supervision is *very* important for motor, social and psychological development. And it is in grave danger, especially in the cities. Many kids hardly play outside anymore. Instead they remain indoors or have to be transported or accompanied by parents (read: the mother) to kindergarten, school or other indoor destinations, thus contributing to parental stress and time constraints for (mostly) mothers, at the same time aggravating traffic problems.

With the results 'Right of Way for Kids' succeeded in establishing the topic on the political agenda of a great many organizations and to raise research interest as well. Next, 'Right of Way for Kids' mobilized local authorities, neighborhood groups and schools to create safe streets and neighborhoods for children. Also they ensured the cooperation of the children themselves. The children proved to be very good advisors for a great many situations. Apart from practical improvements, one of the results is that more and more commissions have adopted the practice to consult the children themselves in matters on their behalf (31, 37, 33, 45). One important commission, who also consulted children, is the Commission on Parental Time Scheduling, who advises government on improvements in facilities for working parents.

The social dimension of sustainable development: making the connections

The NVR (Netherlands Council of Women), an umbrella organization covering 54 women's organizations started in 1996 a project on sustainable development. First they collected information, both from and for the member organizations, which cover about the entire social range, from anti-alcoholism to new spiritualist movements. In several 'sounding board meetings', the issues were discussed with representatives of the member organizations. In the course of this process, the project commission became to realize that sustainable development in the Netherlands is all about physical regulation and target groups, for instance 'consumers' but none about the people involved, let alone women and the quality of their life. Now they started to track down the mere handful of researchers and environmentalists with a broader vision and to develop their own vision of a sustainable society. They have succeeded to raise considerable interest and commitment from their own member organizations for all environmental programs, including the Cairo Programme of Action by employing this wider notion of sustainable development. They are providing impetus for sustainable development as a major theme in contemporary feminism. Their interference also caused the Ministry of Housing, Physical Planning and Environment to reformulate their concept of 'consumers' into 'citizens' and to make a start with the conceptualization of the social dimensions of sustainability.(30, 44, pers. comm. Alice Bouman, NVR).

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13. The Budapest Collective: NGOs for Coherence in Social and Environmental Policy [1]

Rosalud de la Rosa, MPH[2]

The WEDO 50-country monitoring project

I was the former women's health policy consultant of WEDO (Women's Environment and Development Organization). I was part of the team that put together the 50-country survey assessing government actions and implementation five years after the ICPD[3] now published with the title Risks, Rights and Reforms (1999)[4]. The survey had three parts: 1) impact of macroeconomic policies to women's health; 2) impact of environmental conditions to women and 3) best practices and constraints in the implementation of the ICPD Programme of Action. NGOs and governments in 50 countries were asked to fill in a questionnaire pertaining to these three topics.

Part of my role at WEDO was to coordinate the European NGO monitoring input to this 50-country survey. We designed this global monitoring report in such a way that we would partner with one NGO in each country. The probability of finding one NGO working on these combined issues (dealing with economic policies and environmental degradation) was close to zero. I got very challenged by this fact. We still have a long way to get NGOs to work on interconnected issues. Yet from Cairo, to Copenhagen, to Beijing, to Istanbul, to Rome -- we heard economics, health, development and environment.

When I was given this opportunity to coordinate this project at WEDO, I saw how these NGOs and individuals became empowered after their involvement with data collection, research and analysis of their national and local situation. The telephone calls and personal relationships we developed while discussing the difficulty of collecting data to make this report a rich one were invaluable during this process. Indeed, I saw from the energy of this group, in particular, what this work could mean.

In the European region, I was very lucky to find a right mix of NGOs -- women's health and rights, development and environmental NGOs. I insisted to find one partner NGO for each country I was to work with and it was quite difficult. The main reason being that very few NGOs have worked nationally on interconnection of issues. But the very idea behind this design was *empowerment* of the partner NGOs, by giving them the responsibility, and subsequently the authority, to present the state of affairs from an integrated perspective.

The Budapest meeting

After they drafted their country reports, in early December 1998, I organized a meeting in Budapest of 8 women from 8 countries, all mothers, who helped put together country reports from both East and West Europe. We met for two days, prior to the ECE/UNFPA Regional Population Meeting, where we discussed

[1] Presentation at NGO-consultation during the CPD (Commission on Population and Development), Special Session of the UN, March 1999, New York

[2] Rosalud de la Rosa is a policy consultant on women's issues. At present she is reviewing success and failure of all 'mid-way' UN-conferences

[3] International Conference on Population and Development, UN, Cairo, 1994

[4] Risks, Rights and Reforms, WEDO, 1999, New York

key findings. What was most interesting that came out of our discussion were common trends for each region, similarities, as well as differences between the two regions. The group spoke from their hearts how women's health and lives are affected by reform policies and environmental degradation. We also discussed the many advocacy and implementation strategies that emerged from best and worst practices. For many of us in the group, it was our first time to participate at the Regional Population Meeting. We found very good allies from UN/ECE and government delegations that helped us succeed to participate in the drafting committee. We invited all the other NGOs present at the meeting to form a collective effort in drafting our NGO statements. It was amazing that with these different "interest" groups of NGOs we became so like-minded. We managed to achieve a lot of improvements in the final document. Our impact was still noticeable in the subsequent global conference on ICPD+5 in The Hague, in February 1999.

The Budapest Collective

We now call our small group the "Budapest Collective". We would like to share and continue that spirit of understanding and cooperation we achieved at the Budapest Conference by promoting an integrated approach of health, population, development and environment. Members of the group continue their co-operation and take a lot of effort to meet on international conferences about social as well as environmental subjects, to give presentations and to expand the network. By mutual sharing of ideas and strategies, we hope to achieve a 'catalogue of tools' for integration and implementation of international policy documents. At the same time, we want to make an impact on each conference, building upon our initial, multidisciplinary and multisectoral cooperation and give high quality input to the policy process.

Attendants to the Budapest Conference

Elena Ballaeva, Women's Reproductive Rights and Health - Senior Researcher,The Moscow Center for Gender Studies (Russia)

Maureen E. Butter, Science Shop for Biology Groningen, in Budapest representing WECF (Netherlands)
Ewa Dabrowska – Szulc, President Pro Femina Association (Poland)

Rosalud de la Rosa, International Consultant, in Budapest representing WEDO (USA)

Oksana Kisselyova, Women's Program Coordinator , MAMA-86 (Ukraine)

Rossella Palomba, Research Director National Research Council - Institute for Population Research, in Budapest representing AIDOS (Italy)

Radosveta Stamenkova, Executive Director Bulgarian Family Planning and Sexual Health Association (Bulgaria)

14. Sustainable and Healthy Housing in the West, a Demonstration Project

J.C.J. de Man, M.D[1]

Dutch Doctors for Sustainable Development ("Vereniging Penn") is a small organisation. It was founded in 1986 by doctors working in Dutch primary health care. Its aim is, focused on Sustainable Development, to bring up to date 19th century hygienic movement in terms of today by simple co-operative research and development (R&D) and by publishing. The main R&D subject "Sustainable and Healthy Housing in the West" is based on a decade experience, achieving "a factor 4" more eco-efficiency in energy-, waste-, drinking water reduction and wastewater treatment based on technological development combined with hygienic modernisation. This paper gives a brief description of the healthy housing project, to give an idea of what hygienic modernisation can mean in practical terms.

Introduction

Sustainability in the West, it means in the philosophy of the Dutch Interdepartmental Research Program Sustainable Technological Development: try to reach in the year 2040 a factor 20 more environmental- and energy-efficiency. Healthy housing in the West, it used to mean: put into practice the principles of hygienics, which contributed so much to health-gain in terms of increase of life- expectancy in the latest century. It should mean: give hygienics an actual content by incorporating environmental and energy-efficient behaviour in order to prevent possible future health-loss due to widespread pollution and climate change, and combine it with influencing present health-loss determinants (responsible for many Western chronic degenerative diseases) such as lack on physical activity and wrong nutrition-habits.
These two elements can be applied on this demonstration project with housing. We want to emphasise improvement of environmental and energy-efficiency by technological development in combination with a hygienic revival.

More than 10 years ago the project started. Two important technological developments were brought together in designing the house:

- treatment of waste and wastewater on a small scale with recycling as an important goal;
- minimising energy-consumption for domestic and related purposes.

These developments are characterised below. Also the environmental- and energy-efficiency improvement is indicated as well as the meaning of the project for healthy and sustainable housing in the West.

Recycling and energy saving provisions

- organic kitchen and garden waste combined with human waste, composted in a composter (capacity 5 to 8 persons);
- remaining waste (paper, glass, metals, chemical waste) separated in fractions for collecting;
- application compost and liquid from composter to vegetable garden;
- greywater (from kitchen, bathroom, washer) treatment in a sieve, aerobic filter, flow-box and pond vegetation (capacity 4 inhabitant equivalents);
- aeration filter and composter integrated in ventilation system;
- optimal insulation fronts and roof (180 mm mineral wool);
- insulation foundation-beams with foam-glass;
- insulating shutters in front of every window;
- careful draught sealing windows and construction junctions;
- avoiding so called cold-bridges in the construction;
- entrance is also a small draught hall;
- storing heat and delayed down-cooling achieved by concrete mass inside the insulation;

- utilising passive solar energy (big windows on the south-west, small windows on the north-east, remaining rooms on the south-west);
- utilising active solar energy (sun-boiler for hot water supply including washer, if necessary additional heated with low capacity modulating geyser (1.1 - 9.1 kw); photo-voltaic installation for electricity generation (yield ca. 600 kwh/year);
- local instead of central heating by radiation panels in living and dining room, heated by the small geyser;
- additional heating by heat regaining with heat exchanger from outward ventilation, flue gas geyser and process heat composter and aerobic filter;
- excessive electricity saving measures (no refrigerator, instead of it a cool easy from kitchen accessible cupboard on the north-east; optimal daylight access to workplaces; lighting with energy saving bulbs; ventilation inside the heating season by way of ventilators heat exchanger and outside by way of ventilation-flaps in the fronts; energy-efficient gas cooker provisions as alternative for electric furnace and magnetron (also important in decreasing indoor air pollution);
- entrance is also "cycle-garage" (long distance HPV's, short distance shopping cycles and foldable ones, transportable in public traffic).

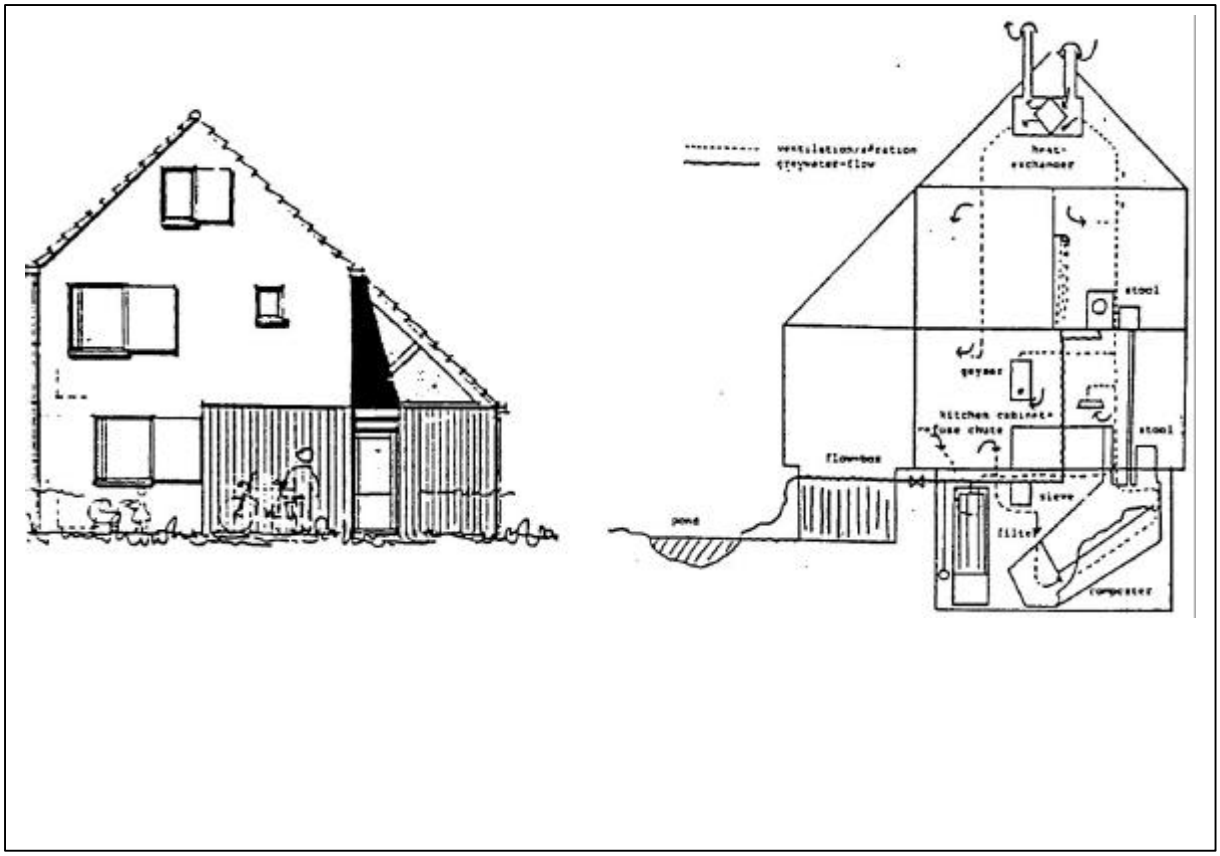


Fig. 1. House, north-east front and outline with composter and greywater-treatment.

Environmental and energy efficiency improvement

An indication of environmental- and energy efficiency improvement gives a comparison with what is called to be "normal". But, when comparing, it is good to realise that "normal" differs all over the world. Here is compared with "normal-Dutch". Also must be taken into account that the application of new tools and processes may give rise to some technical problems.
We employ indicators to environmental performance in four fields are, (inter-)related with time and place dependent environmental problems:

1. wastewater-treatment,

indicated by four parameters: Biological Oxigen Demand, total Nitrogen, total Phosphor, total Potassium (hypothetical),

related directly with water pollution and indirectly with drinking water production;

2. waste production,

indicated in weight in kg/5 persons/year, divided in five fractions,
related with landfill problems (contaminated soil and groundwater pollution) and waste-incineration (air pollution);

3. drinking water consumption,

indicated in m3/5 persons/year, divided in five fractions,
related with drying out-problems;

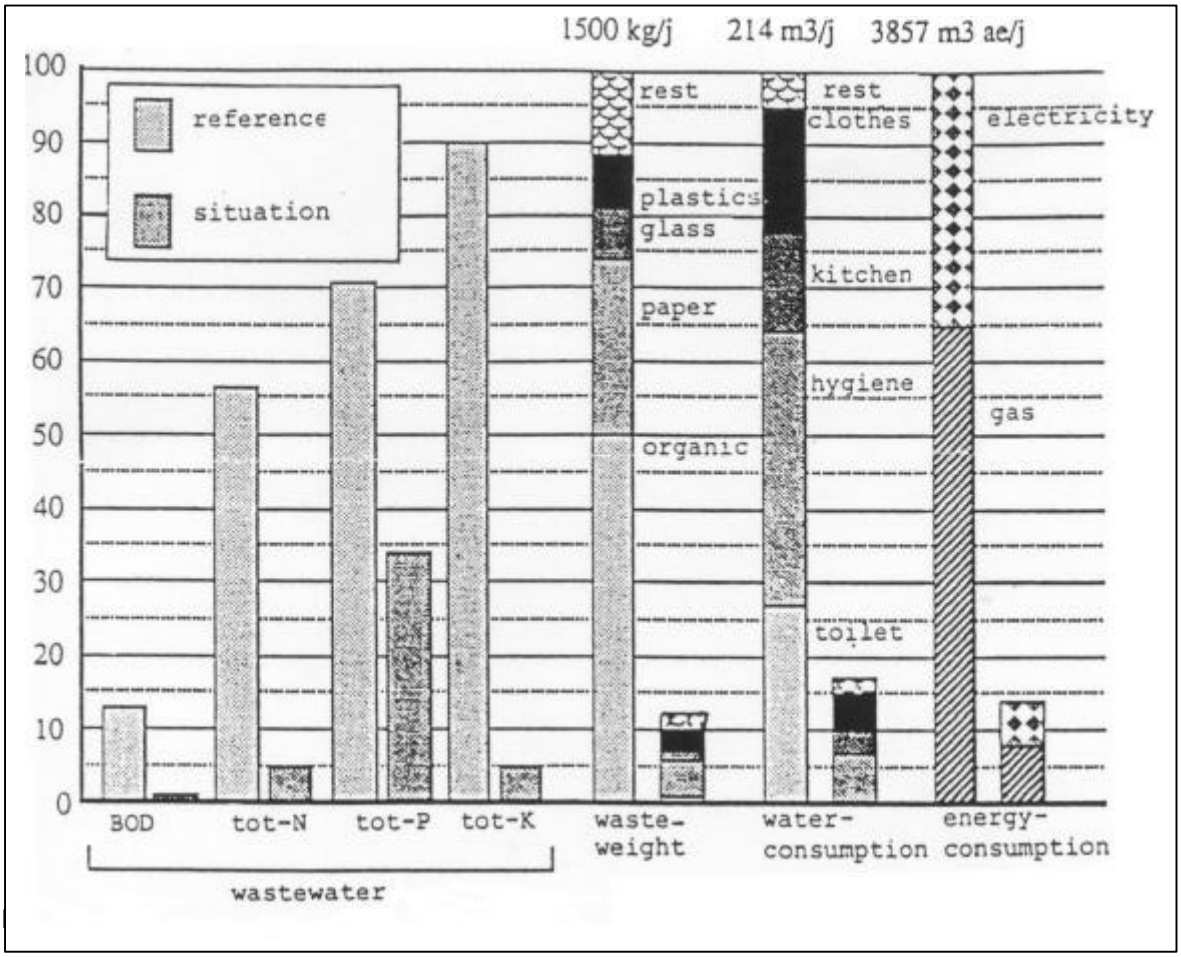
4. energy consumption,

indicated in natural gas-equivalents, divided over natural gas and electricity, not corrected for detached or not, average house occupation, newly built housing, etc.
related with the greenhouse problem, local in- and outdoor air pollution.

The efficiency improvement amounts per annum to (in %, compared to 1987/ 1988)

- about 50% less water pollution mainly due to the composter (minus 37% BOD, 82% total-N, 30% total-P, 80% total-K) without increasing pollution to air or groundwater;
- more than 80% less domestic waste, mainly due to composting and re-using the organic fraction, and by separating the other fractions for recycling;
- more than 80% less drinking water consumption, by toilet without flushing and enhanced efficiency and suitability in hygienics, kitchen and washing;
- over 80% saving in energy consumption, mainly achieved by minimal-energy measures.

Efficiency improvement cannot be considered properly without taking into account progress in "recycling-behaviour" of waste and wastewater from the awareness that separating first is far more efficient than afterwards. Also important is "climate conscious" energy consumption-behaviour in attentive managing and using the heating, ventilation, hot water supply- and photo-voltaic system.



Meaning of the project.

This project can be seen as exemplary and transferable in demonstrating first steps towards sustainable and healthy housing in a Western situation. For it is true that a factor 20 more environmental and energy efficiency is not reached by the year 2040. Nevertheless the direction is shown in the combination of broad integrated innovative technology and hygienics, actualised in preventing present health-loss, together with possible future health-loss due to widespread pollution and climate change.
Hygienics in this sense can be considered as a Sustainable Technological Development motivating and directing factor as it was in Western Europe during the nineteenth century. Because it urges for far more "cycling- and recycling-behaviour", it motivates not only to improve environmental and energy efficiency of technology as such, but it also directs it another way. This is for example the case in waste- and wastewater treatment, although in the present stage still much research and development has to be done to improve efficiency and cost-effectiveness, and last but not least to implement "old" hygienics.

The project necessitates further research and development with real chances for contribution to, or spin-off of a wide range of new products varying from energy efficient gas cooker-provisions to high standard composter linked seats. It may thus contribute on improving the labour market. The cultural meaning is best characterised by a reaction from "East and South" reproaching "the West" no real contribution to Sustainable Development: "In this project the West is credible".

Realisation.

Design House, Prof. ir. J. Kristinsson (Technical University Delft, Faculty of Architecture), design installation J. Slootweg, design composter R. Lindsröm (Sweden), concept greywater treatment A. Rockefeller (United States), design greywater treatment under the authority of the Dutch Ministry of Housing, Physical Planning and Environment by Witteveen and Bos engineers office, sunboiler Zonnevang, photo-voltaïc installation E. Sjoerdsma, Dutch Union for Sustainable Energy and Dutch Society for Energy and Environment.

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[1] Hans de Man, M.D. is secretary to Dutch Doctord for Sustainable Development ("Vereniging Penn")

15. Environment & Health - Some Burning Issues

Jan Juffermans[1]

In more than 25 years of work in the field of environmental issues and sustainability, we came across several interesting cases with health aspects. Here we give a short overview with some recommendations.

1. Less and better meat - more health

For ecological and global food security reasons we promote a sustainable menu, including the advice to eat less meat of a better quality (organic). But also just for health reasons the people of Europe should reduce their meat consumption by 50%. It will reduce our Ecological Footprint drastically, but we will also save on the national budget for health services in the long run. Higher taxes on meat and meat products and more communication about health aspects might help to change the consumption patern. In Holland, people with a high socio-economic status eat now already about 25% less meat than those with a low socio-economic status!

2. Nice green but poisoned wood

As an alternative for tropical wood, in many Dutch gardens you see now a lot of nice green wood. Still very few people know that this wood is impregnated with dangerous (black list) waste from the metal industry, including arsenic, chromium and copper. The copper gives that green colour. Even out door playing objects for children are made of it. In about ten years the poison will leak out of the wood and causes, direct and indirect, dangerous situations. In a later stage, when the wood gets burned as waste, the poison causes a risk from the smoke and ashes: cancer and genetic changes. From an economic point of view, it is sad that a large quantity of wood is no longer safe as a source of energy. The Dutch High Court has concluded that it is impossible to select the poisoned wood from a pile of waste wood, so the whole wood waste fraction is lost. For many reasons the use of poison in wood should stop. There are enough alternatives, like European hard wood, recycled plastic and tropical hard wood with FSC-label.

3. Diesel-smoke and noise are killing in town

Dr. Spatz from Germany (Bremen) is very clear: Exhaust gasses of diesel cars, trucks and busses, and also too much traffic noise in town, cause more victims than traffic accidents. Especially black diesel smoke is dangerous and stays longer in between buildings. So people will inhale it. Spatz did research and made calculations for Bremen and Berlin, under quite conservative assumptions. Yet, the results were very disconcerting. For some streets he advised the people living there to move to another street or to become active to change the traffic intensity. The best way to get rid of this problem is to promote car free centres and other means of public transport. Electric vehicles fuelled by sustainable energy sources are the cleanest, but their quietness might cause another form of risk. Special traffic lanes will be necessary. And give free way to the bikes.

[1] Jan Juffermans is senior staff member of De Kleine Aarde / The Small Earth. The Small Earth is a national education and exhibition (2 hectares) centre for a sustainable world. The centre promotes sustainable and healthy lifestyles, based on organic farming, ecological food and a modest use (a fair earth share) of the global resources, like energy and raw materials.

4. Fly more - cause more skin cancer

The quickest way to enlarge our Footprint is going by plane. In just one or two hours flying one consumes the amount of oil good for a whole year heating a house. So the result of a flight in terms of CO2 emissions is impressive; an effective contribution to the greenhouse effect and climate change, with direct and indirect health effects. Moreover the planes are damaging the ozone layer, with the effect of more skin cancer. So flying to the sun for holidays is at the same time making sunbathing more and more dangerous! A contribution to the solution is a higher price (green taxation) for kerosene, air tickets and a stop on flying with the present aircrafts on distances less than 1500 km (and promote alternative transport like trains). The start of using airships as an attractive alternative is important as well.

5. We did not order this cocktail

More and more questions about strange health effects, like various forms of allergic reactions, are asked these days. Our hormonal and whole life system is effected. And we try to discover one or two reasons. But this is impossible. With all colouring, preservatives, and other additives in food, in addition to a good portion of air, soil and water pollution, we get a daily cocktail we never ordered. And as a bonus, we now get the new genetically modified products from the market. We did not ask for that as well. Let's clean the food chain by high penalties on all pollution of natural products (the polluter pays principle), clear labels and strong communication about the real reasons for the international food flows. Instead, healthy and sustainable food security should be based on short lines between producers and consumers and mainly organised on a regional level. And international food trade should be based on sustainable agriculture, so no more monoculture, and a mineral balance for healthy soils.

6. A too big Footprint? "We did not know....."

After the Second World War and the killing of millions of people, many times the expression "We did not know...." was heard. Now 20% of the world population, mainly living in the rich countries, is claiming 80 to 85% of the global resources (see the Human Development Report, 1998). And we know also that another 20% of mankind is suffering from shortages, like water, food, energy, and money for education and health care. But we might not know yet the linkage between the two 20% figures. The Footprint model helps us to understand the global critical situation. And to calculate our own Footprint, to see where we stand now and it will become a matter of mental health and human rights, to start trying to live within our Fair Earth Share. On a relatively small earth with quite a large population, it will be wise and worth to share the commons and resources equally, also leaving some space for the billions of other species.

With the Footprint model it will become possible to develop a more responsible and healthy global society, based on a businesslike system.

NGO directory

Monitoring Network for Health and Environment/
Miep Verheuvel
Piccolo 38 3068 HR Rotterdam , Netherlands
Tel./ Fax.: +31 10 455 82 01 E-mail : gezomil@worldonline.nl
The Monitoring Network for Health and Environment is a Dutch NGO, which registers environmentally related health complaints. Both health complaints and environmental circumstances are coded and saved in a national database. Researchers and institutes can use these data for further research. The data provide signals demonstrating people's perception of environmental pollution.
In addition, these data can help to gain insight in complex interactions between health and environment, relationships, which are always disputed and almost impossible to validate. The more signals from different sources point in the same direction, the more readily such issues will be generally accepted. Similar complaints from independent parties, for instance health problems related to low frequency noise, waste incineration, high voltage lines etc, in general will help citizens to request further research or appropriate measures.

WECF, Women in Europe for a Common Future
Marie Kranendonk
PO Box 12111 3501 AC Utrecht, Netherlands
phone: +31-30-2310300 fax: +31-30-2340878 Email: wecf@antenna.nl
WECF is a non-governmental, not-for-profit organization that supports women and children in ecological disaster areas in their efforts to reduce pollution and improve their health. Women from 15 European countries established WECF in 1992, during the UNCED Earth Summit in Rio de Janeiro.
Women are often doubly affected by health problems. Firstly, because of their own often more precarious health situation, when for example pregnant. Secondly, because of their traditional role of caring for children and the family. At the same time it is often women who play a catalyst role for change. The projects that WECF supports assist women to understand the causes of their problems and to organize activities to improve their health and environment. These activities focus on practical solutions as well as on increasing women's participation in local and international policy making.

The Science Shop for Biology
Maureen Butter
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Tel +31 50 363 23 85 Fax +31 50 363 52 05 E-mail: M.E.Butter@biol.rug.nl
Most universities in the Netherlands have one or more 'science shops'. These were established in the seventies, in order to give groups and organizations without money access to academic research facilities. The Science Shops carry out research assignments from NGO's against low or no costs, mostly by incorporating the research project in the students' curriculum. Complete address information of all Dutch Science Shops and sister institutes in other countries is offered at the website of the General Secretariat of the Dutch Science Shops: http://wwwbu.tudelft.nl/wetensch/lsw/ehome.htm.

NVMM, Dutch Association for Environmental Medicine
Wim Zwart Voorspuy
Cattepoelseweg 268 6815 CK Arnhem
w.zwart-voorspuij@ocw.denhaag.nl
The Dutch Association for Environmental Medicine has been founded in 1988 in Lekkerkerk, Netherlands. The core of members of the association existed of environmental health physicians. In due time other disciplines became part of the association. September 1998 the NVMM had approx. 150 members. The association organizes scientific meetings, develops educational material and brings forward problems in environmental medicine.

Gelderse Milieufederatie/ Environmental Federation Gelderland
Eric van Kaathoven
Jansbuitensingel 14 6811 AB Arnhem
tel 026 3515069 Email e.kaathoven@gmf.milieu.net

The Environmental Federation Gelderland is one of the twelve provincial federations of local environmental NGOs.

Ecobaby
Janna Koppe
Roosmarijnhof 29 1115 DW Duivendrecht
The Netherlands
Tel/ fax 31 20 699 32 13 Email: J.G.Koppe@mail.uva.nl
Ecobaby's mission is to promote healthy and supportive environments for children to grow up and to protect the fetus and child from environmental hazards.

Dutch Doctors for Sustainable Development/ Vereniging Penn
Hans de Man
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Phone/ fax: 31 72 53 36 693
Dutch Doctors for Sustainable Development ("Vereniging Penn") is a small organization. It was founded in 1986 by doctors working in dutch primary health care.
It's aim is, focused on Sustainable Development, to bring up to date 19th century hygienic movement in terms of today by simple cooperative research and development (R&D) and by publishing.

De Kleine Aarde / The Small Earth
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The Small Earth is a national education and exhibition (2 hectares) centre for a sustainable world. The centre promotes sustainable and healthy lifestyles, based on organic farming, ecolological food and a modest use (a fair earth share) of the global resources, like energy and raw materials. The work is supported by 11.000 donors, who receive the quaterly 'De Kleine Aarde'. Besides contacts with simular eco-centres in Europa, there are also good contacts with Small Earth centres in Kenya and Uganda.

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Ineke Felix, Doctors sans Frontiers Amsterdam
Sanne Lamers, Milieu Centraal
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Marga Jacobs, Vereniging Leefmilieu
Bernadette Vieverich, Friends of Earth Netherlands

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